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ABSTRACT

The individual play habits and social interaction styles of 71 hearing impaired and 71 normally hearing preschool children were studied. Children were individually placed in a television studio constructed to resemble a nursery school, and videotape cameras were situated to record all activity occurring within the set. Evaluation of the 142 videotapes concerned both activities performed and objects engaged. Results indicated that hearing impaired children were more active, displayed more scanning behaviors using all sensory modalities, displayed more fearful behaviors, and engaged in little actual play. The social interaction study consisted of an evaluation of three triads each of normally hearing and hearing impaired children by means of an interaction rating scale. Researchers found that the hearing impaired groups were less cohesive and produced fewer successful social contacts than the normally hearing children. Gesturing as a communication device was more evident in hearing impaired children than was speech. (Author/GW)

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FINAL REPORT

Project No. 45-2109
Grant No. OEG-0-9-452109-2467

A STUDY TO ASSESS THE PLAY ACTIVITIES AND GESTURE OUTPUT OF HEARING HANDICAPPED PRE-SCHOOL CHILDREN

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April, 1972

U. S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Education for the Handicapped

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SUMMARY

The purpose of this project was to study the individual play and social interaction styles of hearing impaired and normally hearing preschool children. The sample for the individual play study consisted of seventy-one pairs of children matched on nine variables. The children were individually placed in a television studio constructed to resemble a nursery school with videotape cameras situated to record all activity occurring within the set. Analysis of the 142 videotapes, consisted of evaluation of both activities performed and objects engaged. The results indicated that the hearing impaired differed from the normally hearing children in the following ways. As a group, the hearing impaired were more active, displayed more scanning behaviors using all sensory modalities, displayed more fearful behaviors, and engaged in little actual play.

The social interaction study consisted of an evaluation of three triads each of normally hearing and hearing impaired children, employing an interaction rating scale. The results indicated that the hearing impaired groups were less cohesive and produced fewer successful social contacts than the normally hearing children. Gesturing as a communication device was more evident in hearing impaired children than was speech.

The results suggest the need to include instruction in play and social dynamics in educational curricula for preschool hearing impaired children.

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PREFACE

This study was conceived as a two-part investigation designed to comment on: 1) the individual play behavior of language handicapped (hearing impaired) children and matched normally hearing children, and 2) on the intra-group communication and interaction patterns in a play environment of hearing impaired children and matched groups of normally hearing children.

For both portions of the study, instruments for analysis of observed behavior had to be developed. It is felt that the rating scales which emerged are worthy of future use and research.

For clarity in the final report, Part I will consist of a presentation, enumeration, interpretation, and discussion of the individual subject data, whereas Part II presents the observation data obtained in preliminary study of the intra-group communication patterns.

PART I

INDIVIDUAL DATA

CHAPTER I

INTRODUCTION

A desired result of the developmental process in children is their mastery of knowledge and/or strategies which will assist in the eventual symbolic manipulation of perceptual and cognitive experience. (Piaget, 1952; Bruner, 1966; Furth, 1969; Miller, 1970) That is, the child must be able to manipulate external information that becomes more and more detached from his immediate experience if he is to function rationally and intelligently within his environment.

In young children, exposure to prerequisite perceptual and cognitive data which leads to utilization of such information in a symbolic way is usually accomplished through the behavioral mechanisms of play and/or verbal communication with either real or imaginary play or communication partners. (Piaget, 1962; Flavell and Elkind, 1969; Furth, 1969) Thus, the development and utilization of play and/or communication behaviors become legitimate areas of investigation.

Statement of the Problem

Traditionally, young children have been viewed as miniature adults with communication, in this context equated with language, and cognitive skills that are on a continuum with the adults found within their environment. (Thorndyke, 1929; Skinner, 1957; Mowrer, 1960) Several researchers have demonstrated, however, that such a viewpoint is not appropriate either linguistically or cognitively. (Piaget, 1954; Vygotskii, 1962; Bloom, 1970; Menyuk, 1971) Instead, they argue, children should be viewed as having linguistic rules and cognitive structures which are unique systems unto themselves, but which are changing and evolving gradually toward the adult model.

Cognitive-oriented psychologists have suggested numerous models to explain the relatively unique process of cognitive growth in children. A statement of the model which seems best to summarize the positions of these various theorists regarding cognitive development might be as follows: (Millar, 1969)

1) Stage I could be labelled imitation, which is defined as motorical and perceptual approximations initiated by the child to occurrences within the environment;

2) Stage II is exploration, defined as the externalization process to achieve precise, reality-oriented knowledge from perceptual and cognitive experience;

3) Stage III is prediction, which is defined as the evolvement of the means-end relationship to decipher meaningful relationships between activity and event;

4) Stage IV is construction, defined as the internalization of perception and cognitive information, which, in turn, allows for the evolution of symbolic or representational activity.

Implicit in such a model is the need for the child to interact with his environment, so that he can evolve systematic symbolic representations which will allow for maximum utilization of external information. The normally developing child interacts with external reality through both language and play. (Piaget, 1962; Furth, 1969) Indeed, when acquiring either the symbolic system of play or language, children have been noted to proceed through the behavioral processes outlined above. (Furth, 1969; Menyuk, 1971) Most children can express gains in cognitive understanding through either symbolic system, but the quality of their intellectual processing reportedly is enhanced greatly by the mutual interaction between the two symbolic systems as each develops. In other words, linguistic symbolic development influences and shapes play symbolic behavior, and vice-versa. (Myklebust, 1960; Furth, 1969) Therefore, the child who lacks normal control of language particularly in the critical preschool years, may still be able to demonstrate his cognitive growth through the medium of play. There is serious question, however, as to the effect or effects of the lack of reciprocal interaction of language and cognition on a child's expression of play. In other words, a hearing impaired child, by virtue of his linguistic disability, could have some atypical play patterns which would make his play expressions different from his normally hearing peers. These differences in play expression might reflect differences in either cognitive growth and/or cognitive organization. Therefore, it is the intent of this portion of the study to investigate the play expressions of hearing impaired children, as they compare to a sample of normally hearing children. This investigation is undertaken as a step toward gaining a fuller understanding of the cognitive development of young congentially hearing impaired children.

Review of the Literature

Research on Play of Normally Hearing Children

Research in the area of play behavior of normally hearing children has been of two types. First, there are studies designed to describe play behavior, spontaneous or otherwise, by enumeration of play activities in which children are known to engage at particular chronological ages, e.g. Calmerton, 1924; Karvin, 1938; Gesell, et. al., 1940; Page, 1954. Such studies are useful to teachers, child development experts, parents, and researchers interested in a general description of either motorical activities or social development, but this type of report has not commented, qualitatively or quanitatively, on the stages of cognitive growth in children, nor on the precise mechanisms involved in the development of cognitive behavior in children. Instead, these reports have merely concentrated on listing broad categories of activity such as "jumping a rope" or "playing tag".

Recently, much attention has been given to a type of study which is directed toward describing the precise nature of concepts employed during play. This type of report is a direct outgrowth of the "cognitive" theory which is currently prevalent in psychology. Most of these latter investigations have been directed toward descriptions of the attainment of specific concepts such as conservation of matter, numbers, and word meanings. (Vygotskii, 1962; Elkind, 1967; Flavell and Elkind, 1969; Piaget, 1969) Such studies are designed to contribute to the description of the play and cognitive/language developmental stages through which normal children pass in attaining cognitive maturity.

Piaget

Foremost among the cognitive development investigators has been Piaget, whose investigations have allowed him to enunciate a formal theory of play development. (Miller, 1970) Piaget conducted studies which allowed him to look at the developmental stages in play behavior either through observation of ongoing activities within prescribed experimental situations, or through direct, structured interviews with children as they played. (Piaget, 1969) Unfortunately, however, the design for much of this research lacked sufficient controls to allow for generalization to other groups of children, particularly those who did not fall in the white, middle class category. In spite of this difficulty, discussion of Piaget's theory of play seems warranted.

Theory of Play

To Piaget, play is "the activity by which a child assimilates external reality to his own internal life." (Miller, 1970, p. 113) This activity called play stands in opposition to the behavior of imitation, which is "that activity by which a child accomodates his own psyche life to external reality." (Miller, 1970, p. 113) In other words, in play the child is incorporating experience into his own psychological processes, rather than adapting his sense of reality to external forces as is the case in imitative behavior.

Piaget sees the period between birth and two years characterized by such behaviors as playing with one's hands, listening to one's own vocalizations, etc. The assimilative play period is a period of preparing the child for the future development of more formalized manifestations of play behavior. During the assimilative play period the child learns to master perceptual and motorical patterns, which provide him with the mechanisms to meet the demands of more organized play behavior.

The period between two and seven years is considered by Piaget to be the time when children develop symbolic games, or games with prescribed rules of performance. To develop such games requires that the child have a sense of regularity or regulation. Such a sense is based not only on motorical and perceptual skills, but also on symbolic representational knowledge. Development of game behavior leads to the highest form of play, which is constructional knowledge. Constructional knowledge is the ability to take objects and reconstruct them into other objects for "information processing purposes". (Piaget, 1962)

From Piaget's theoretical model, play can be divided into two aspects. First, there are pre-play behaviors, which are mechanical in nature. They involve either motorical or perceptual organizational activities, which are performed to provide a milieu in which more formal play activities can occur. For instance, exploratory and/or setting up types of behaviors while playing might easily be seen as falling into this general category of pre-play behavior. This behavior in older children is analogous to the assimilative play stage of children younger than two years. Second, there is "construction" or actual play behavior. It is this particular aspect of play which is generally identified as play by the untrained observer. Therefore, to describe completely the play behavior of children, it is necessary to observe and enumerate both pre-play and play behaviors.

Formal Research

Since Piaget's theory of play was predicated on research procedures not conducive to generalization to other groups of children, consideration of formal research projects employing his general model of cognitive development needs to be made. Most of the formal research conducted by Piaget and his associates have dealt with the evolution of specific concepts necessary for adequate symbolic activity, and, thus, indirectly with play. The classic studies reported in the literature on object constancy, conservation of matter, means-end differentiation, logical thought, and numbers are indicative of this type of research. (Flavell and Elkind, 1969) Unfortunately, such studies do not describe how these Piagetian concepts are employed in free, spontaneous play situations available to most children.

Vygotskii

A second major researcher into cognitive development of children was Vygotskii. (1962) Although his research was not directed toward the study of formal play behavior, the data he generated allowed him to comment on symbolic acquisition in children, which could also include the evolution of the symbolic aspects of play. Vygotskii studied the development of word-meanings, but since he was investigating the fusion between meaning and sign, his information is quite relevant to other areas of symbolic functioning, namely, play, where the basic unit of behavior could be the action-meaning. The latter term could be defined as the fusion of meaning with a particular action or action sequence.

To study systematically the evolution of word-meanings, Vygotskii employed a block sorting task, in which the subject was asked to classify blocks into categories or units while discussing simultaneously what he was doing and why. Interestingly, part of Vygotskii's sample was a group of hearing impaired children from the Institute of Defectology in Moscow. From these investigations, Vygotskii proposed the following stages of symbolic development: 1) undifferentiated mass categories attached to particular words; 2) functionally based categorization, e.g. hammer is to nail because you pound the nail into wood with a hammer; 3) superordinate-subordinate classification, e.g. hammer, chisel, and axe belong together because they are tools; and finally, 4) functional superordinate-subordinate classification, e.g. the class tool is used to pound the class "nail-like" objects into the class surfaces. Examination of the precise nature of each of the stages could lead one to say that Vygotskii's stages 1 and 2 approximate pre-play behavior, whereas his stages 3 and 4 approximate "construction" or play behavior.

Although looking at symbolic development in an apparently different contentive area, Vygotskii's findings seem to support empirically Piaget's contentions concerning play behavior. However, like Piaget's formal research procedures on the development of specific concepts, Vygotskii's data were not generated under spontaneous test conditions, so that predicting how children will react under spontaneous play situations still remains uncertain.

Research on Play of Hearing Impaired Children

Extensive research has been reported on the intellectual growth and psychological functioning of hearing impaired children. (Pintner and Reamer, 1916; Peterson and Williams, 1930; Shirley and Goodenough, 1932; MacKane, 1933; Schnick, 1934; Springer, 1938; Zeckel and Van der Kolk, 1939; MacPherson, 1948; McAndrews, 1948;

Templin, 1950; Birch and Birch, 1951; Frisina, 1955; Wright, 1955; Hiskey, 1956; Blair, 1957; Costello, 1957; Fiedler, 1957; Fuller, 1959; Farrant, 1960; Myklebust, 1962; Lowenbraun, 1969; Moores, 1971) This research has been geared toward the specification of hearing impaired children's performance on particular mental, educational, and psychological tests, with little specific attempt to describe the evolution of the particular symbolic process of play behavior.

As was true of research with normally hearing children, there have been no studies reported in the literature which systematically explored the spontaneous play behavior of hearing impaired children. However, several studies have been reported in which Piagetian tasks were utilized with hearing impaired children.

Oleron (1958), in a series of studies on various aspects of concept formation using Piaget-type tasks, found that hearing impaired children were inferior to normally hearing children in their performance of these tasks, but that with sufficient instruction, it was possible to increase the hearing impaired child's performance to levels equivalent to normally hearing subjects. In other words, Oleron ascribed lack of adequate performance to insufficient experience or instruction in the conceptual areas tested rather than to a deficiency in the hearing impaired children themselves.

Furth (1964), when using a variety of Piaget inspired nonverbal cognitive tasks, found that hearing impaired children were only deficient in their performance when a linguistic factor complicated the task. If the linguistic factors were minimized or eliminated, hearing impaired children's performance on Furth's conceptual tasks was found not to be deviant from that expected from normally hearing children of comparable age. Therefore, according to Furth, conceptual development in hearing impaired children would only be retarded or different in those cognitive areas where language played an important factor.

Fishbein (1971), in a study of object constancy, found that the developmental sequence of young hearing impaired children was significantly deviant from that of the normally hearing children he studied. The deviancy took the form of non-predictability in that his hearing impaired subjects did not display the same developmental stages, either quantitatively or qualitatively, as did his normally hearing sample. This disparity in the results lead him to suggest that his hearing impaired subjects, while performing this task, may have been operating from a base of informational input which was significantly different from his normally hearing subjects. Whether the cause of this difference was a function of hearing impairment, language deprivation, or other factors could not be determined.

In sum, then, these few studies on the cognitive growth of hearing impaired children suggest that there is a difference in some of the developmental sequences between hearing impaired and normally hearing children, with regard to acquisition of such specific concepts as object constancy, linguistically influenced nonverbal tasks, and conservation of matter. Is it reasonable to assume, then, that some differences in spontaneous play behavior might be exhibited when matched pairs of hearing impaired and normally hearing children encounter an unsupervised play situation? Specifically, will there be differences either in the pre-play or play behavior noted between normally hearing and hearing impaired children? How will pre-play and play behavior arrange themselves sequentially within a given test situation for the two types of children. Antidotal reports in the literature suggest that hearing impaired children need to be "taught" how to play, a function easily acquired by normally hearing children without undue outside instruction, just as they must be "taught" language. (Kharasch, 1965; McDermott, 1970) The accuracy of such impressions remains to be seen.

Experimental Questions

The purpose of this study was to observe the spontaneous "play" behavior of preschool hearing impaired children and preschool normally hearing children to ascertain any differences among the children in terms of activities performed and sequential processing of these activities. The following questions were suggested for evaluation of the experimental results:

1. a. When placed in an individual play situation, were hearing impaired children more active than normally hearing children?

b. When placed in an individual play situation, was there any change in the amount of activity observed for the normally hearing or hearing impaired children over time?

2. a. When placed in an individual play situation, did hearing impaired children undertake different types of activites than normally hearing children?

b. When placed in an individual play situation, was there any change in the type of activity observed for the normally hearing or hearing impaired children over time?

3. When placed in an individual play situation, were there differences among the hearing impaired children and among the normally hearing children when each was compared to their group's performance?

4. a. When placed in an individual play situation, did hearing impaired children engage more toys than normally hearing children?

b. When placed in an individual play situation, was there any change in the number of toys encountered by normally hearing and hearing impaired children over time?

5. When placed in an individual play situation, was there any difference in the types of toys engaged by the normally hearing or hearing impaired children over time?

CHAPTER II

SUBJECTS, EQUIPMENT, AND PROCEDURES

Subjects

Selection Procedures

To obtain a sample of children appropriate for this study, the names of all hearing impaired children between the ages of three to six years known to the Cincinnati Speech and Hearing Center and the Cincinnati General Hospital's Division of Speech and Hearing were obtained. Only children residing within a reasonable commuting distance of the Cincinnati Speech and Hearing Center were considered for inclusion in the study. As a result of this search, the names of eighty-nine hearing impaired children were located.

Personal contact, either through correspondence or by telephone, was made with the parents of these eighty-nine potential subjects to solicit their cooperation in this study. Of this group, seventy-eight families initially agreed to participate in all aspects of the study. However, because of transportation difficulties and/or other family complications, three of these seventy-eight potential subjects could not be filmed, thus eliminating them from further consideration. Two additional subjects were filmed, but because of malfunctioning of the videotape equipment, scoreable data could not be obtained. These two children were also eliminated from the study. In addition, two children were excluded from the study due to previously unreported secondary handicaps of sufficient magnitude as to adversely affect their performance. With these seven exclusions, a final sample of seventy-one hearing impaired children was obtained.

Since the primary objective of this project was to compare the play performance of hearing impaired children to that of a comparable group of normally hearing children, a normally hearing sample was also obtained. This sample was obtained through contacts with nursery school and day care centers throughout the greater Cincinnati area, which included Northern Kentucky, and through contacts with interested parties such as school psychologists, educators, special educators, clergymen, and other community leaders.

Matching Criteria

For control purposes, it was decided to match the normally hearing sample to the hearing impaired sample on the following criteria:

1. Age: The two children forming a pair were considered to be equivalent on this variable when their chronological ages were within four months of each other.

2. Sex

3. Religious Affiliation: A four-way classification system was found to be satisfactory, namely, Protestant, Catholic, Jewish, and No Preference/Non-Church Goer.

4. Socio-economic Class: The Hamburger Socio-economic Scale was employed to ascertain socio-economic status. This scale takes

into consideration the head of household's occupation and number of years of education. Use of this scale allowed for avoidance of investigating specific income levels, a topic which many of the participating families might have refused to divulge. The scale is constructed so that a score of one indicates the highest socio-economic rating, while five represents the lowest.

5. Geographic Area: It was felt that wide differences in geographic area even of the same socio-economic class could reflect differences in the value attached to play behavior and interpersonal communication habits. Differences in general child rearing philosophies, family orientation, and parental values might be reflected in the play behavior and interpersonal dynamics demonstrated by children of different geographic settings. For instance, Mt. Adams is an area within Cincinnati where many professional and/or "arty" families live, whereas many professionals also live in Indian Hills, but the residents reflect more of a "business man", upward mobility orientation. Both groups of residents might fall within the highest socio-economic classes according to the Hamburger Scale, but should be considered distinct communities within the larger metropolitan area. Therefore, attempts were made to have pairs of children matched within reasonable geographic distance of each other to exercise some control over possible environmental sources of influence. The distance between residences of experimental pairs proved to be only twelve blocks at the most. Sixty-seven out of the seventy-one pairs fell within an eight block distance of one another which suggests that all experimental children were from geographically similar communities.

6. Family Position: An attempt was made to hold birth order

within the family constant within pairs of children. In fifteen instances, older children no longer residing at home were not considered as part of the birth order count. To provide an example of this procedure, in one case of a normally hearing child, there were two brothers no longer living at home, one being in the service and the other in another community not within commuting distance of the home. In this particular case, the sole child living at home was considered an only child. It is recognized, in this particular instance, that the reactions of the parents to this child should not be considered exactly comparable to those of parents who have never had another child. But in the interest of obtaining a suitably large number of children for filming purposes, it was decided to declare the two situations to be comparable. In the majority of the fifteen cases in which older siblings not at home were disregarded, the experimental child was not alone however, but was classified as coming from a smaller family in slightly different birth order than was the actual case. Thus, some compromises had to be made on this variable, but the effects of the compromises were felt to be so small as to be negligible.

7. Intelligence: The children constituting a matched pair were required to be within one standard deviation of each other on a suitable test of nonverbal intellectual ability. In all cases, the same nonverbal intelligence test was administered to both children being considered for matching purposes. Depending on the age of the child and his general maturity level, the following instruments were employed: the Merrill-Palmer Test of Intelligence, the performance section of the Wechsler Primary and Preschool Scale of Intelligence, or the performance section of the Wechsler Intelligence

Scale for Children. All psychological testing was conducted by a person familiar with the problems of testing young children, hearing impaired and normally hearing.

8. Race: A two-way classification system was employed, namely, white or Caucasian and black or Negro. In two instances, children were of obvious biracial parentage. In both instances, classification was made on the basis of residence. Both of these children resided in neighborhoods predominately black in composition and were considered black children by their teachers, other classmates, and/or neighbors.

9. Family Status: A two-way classification system was employed, namely, parents living together and parents not living together. The latter category subsumed unwed mothers living alone, separated parents, divorced parents, widowed parents, and one unusual situation in which the father resided in Cleveland and the mother in Cincinnati.

10. Secondary Handicaps: Hearing impaired children without obvious secondary handicaps such as behavior disorders, motor problems, or visual impairments were sought. However, several of the handicapped sample were the products of maternal rubella pregnancies which resulted in a unilateral peripheral visual problem in addition to a hearing impairment. The effects of this additional sensory handicap were evaluated by teacher and parent report. If this specific secondary problem did not appear from reports to be significantly retarding development, the child was included for study. In no case did a normally hearing subject exhibit any notable sensory, socio-economic, or motor handicap.

11. Educational Experience: An effort was made to pair the

hearing impaired children who had extensive educational experience with normally hearing subjects who had formal preschool training. Due to the fact, however, that most of the hearing impaired sample had received some early training, accurate matching on this particular criterion was difficult to obtain; therefore, this criterion was not stringently enforced as compared to the ten previously mentioned variables.

Description of Sample

The sample included for consideration in this study consisted of seventy-one matched pairs of children resulting in 142 subjects. Table 1 presents the compiled data for age and IQ distribution for all 142 subjects included in this study. As can be seen, the experimental children range in age from three years six months through five years eleven months, and in nonverbal IQ scores from 85 to 132. The great bulk of children, however, fell age-wise in the four year through five year six month level, and intellectually within the 90 to 115 IQ range.

Tables 2 and 3 present the descriptive data on socio-economic class, sex distribution, religious affiliation, race distribution, family status, and birth order for each of the seventy-one pairs of children. Since this information was required to be the same for both the hearing impaired and normally hearing subject, there was no attempt to differentiate between the two groups. As can be seen, most of the children can be characterized as being male, Christian, middle class, Caucasian children, who live in homes where the parents are living together and the number of siblings are below three in number. Exceptions to each of the above categorizations are apparent, however.

TABLE 1

MEAN AGES AND INTELLIGENCE QUOTIENTS FOR THE 142 SUBJECTS DISPLAYED BY HEARING STATUS

Group	N	Age		IQ	
		$\bar{X}$	Range	$\bar{X}$	Range
A-HI	8	3.85	3-5 - 3-11	107.00	85 - 129
A-NH	8	3.75	3-5 - 3-11	112.37	92 - 130
B-HI	18	4.33	4-0 - 4-5	107.67	95 - 124
B-NH	18	4.41	4-0 - 4-5	105.22	93 - 123
C-HI	18	4.75	4-6 - 4-11	106.78	91 - 129
C-NH	18	4.83	4-6 - 4-11	113.50	96 - 137
D-HI	19	5.25	5-0 - 5-5	104.68	91 - 121
D-NH	19	5.25	5-0 - 5-5	103.68	85 - 122
E-HI	8	5.82	5-6 - 5-11	106.00	91 - 129
E-NH	8	5.75	5-6 - 5-11	109.13	99 - 124

TABLE 2

SEX, RELIGIOUS AFFILIATION, SOCIO-ECONOMIC STATUS, RACIAL, AND FAMILY STATUS DISTRIBUTION FOR THE 71 PAIRS OF SUBJECTS USED IN THIS PROJECT

Group	N	Sex		Rel. Af.[a]				So.-Econ.[b]					Race		Fam. Situa.[c]	
		M	F	P	C	J	N	1	2	3	4	5	B	W	PLT	PNLT
A	8	6	2	4	1	3	0	1	1	2	2	2	0	8	6	2
B	18	10	8	9	8	0	1	1	3	6	4	4	2	16	10	8
C	18	10	8	10	7	0	1	2	5	5	3	3	3	15	13	5
D	19	14	5	10	5	2	2	2	2	8	3	4	1	18	16	2
E	8	6	2	2	6	0	0	0	1	5	2	0	0	8	7	1

[a] P refers to Protestant, C to Catholic, J to Jewish, and N to No Affiliation.

[b] The numbers 1 through 5 refer to the socio-economic status ratings included in the Hamburger Scale of Socio-Economic Status.

[c] PLT refers to Parents Living Together, while PNLT means Parents Not Living Together.

TABLE 3

FAMILY SIZE FOR EACH OF THE 71 PAIRS OF SUBJECTS USED IN THIS PROJECT

Group	N	Family Size (No. of Children)						
		1	2	3	4	5	6	7+
A	8	3	2	2	1	0	0	0
B	18	5	6	4	1	2	0	0
C	18	7	5	3	1	0	1	0
D	19	5	6	2	1	5	0	0
E	8	4	2	1	1	0	0	0

Table 4 displays the hearing status by frequency in the better ear for the hearing impaired sample. The figures show the upper limit, as well as the median point, for each of the frequencies tested, namely, 250 Hz through 8000 Hz. These figures would tend to support a conclusion of wide variability among the children in hearing status, but all hearing losses were of sufficient degree to interfere with the normal course of linguistic development. Such a definition seems a suitable one for defining significant hearing impairment in a preschool population.

Because of the emphasis on early amplification as a means of assisting hearing impaired children in overcoming the educational barrier posed by their handicap, Table 5 presents the number of years of amplification experienced by the seventy-one hearing impaired children included in this study. Since these data seem to indicate wide variability in the amount of time children have been exposed to hearing aid usage, it would seem reasonable to assume that this factor might constitute a discriminating variable in the subsequent analyses warranting its inclusion as a descriptive variable.

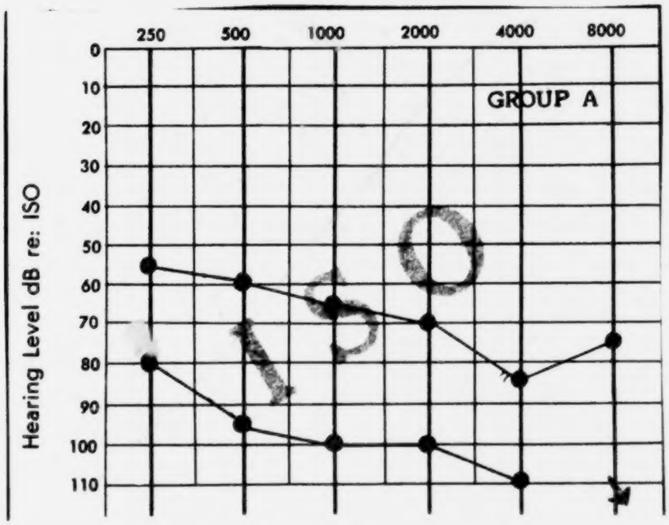
Equipment

Construction of the Television Studio

To provide an environment which would allow for maximum display of play activity and yet provide for adequate recording of behaviors, a television studio, which resembled as closely as possible a nursery school setting, was designed and built with the assistance of a research assistant from the Radio-Television Department at the University of Cincinnati, with consultation from the chairman

TABLE 4

MEDIAN VALUE AND UPPER LIMIT BY FREQUENCY FOR THE 71 HEARING IMPAIRED SUBJECTS USED IN THIS STUDY



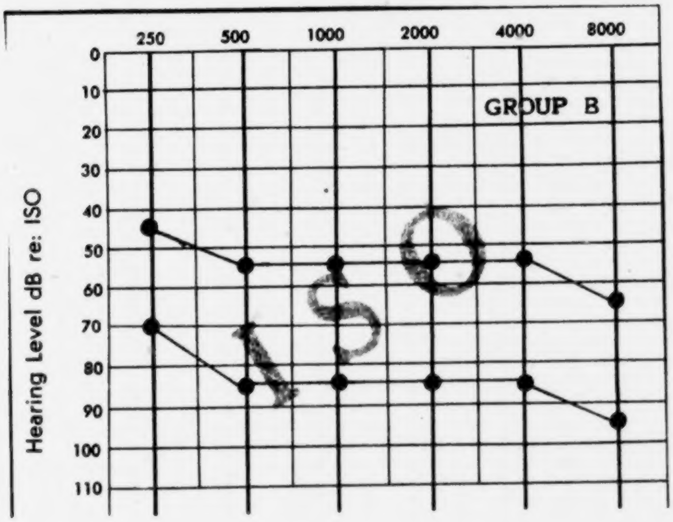
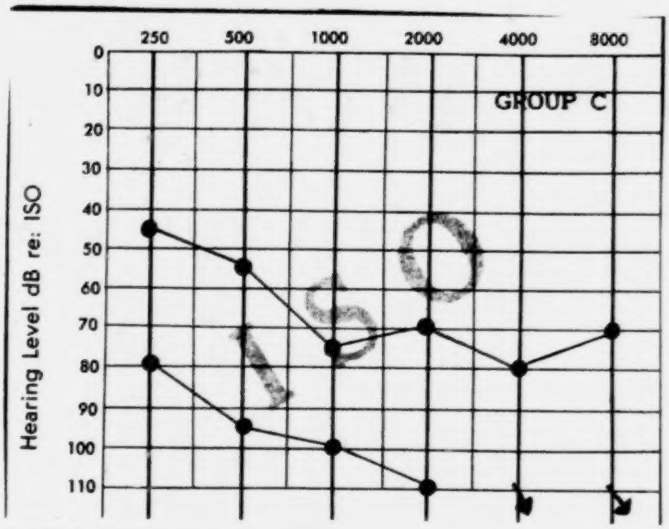
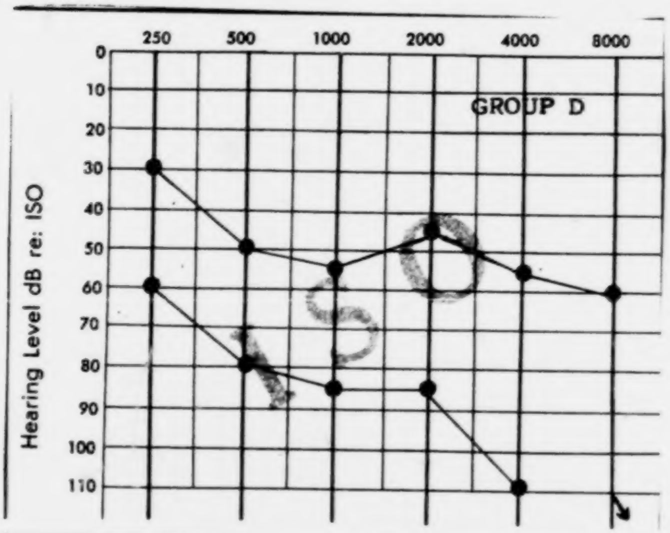


TABLE 4 - Continued





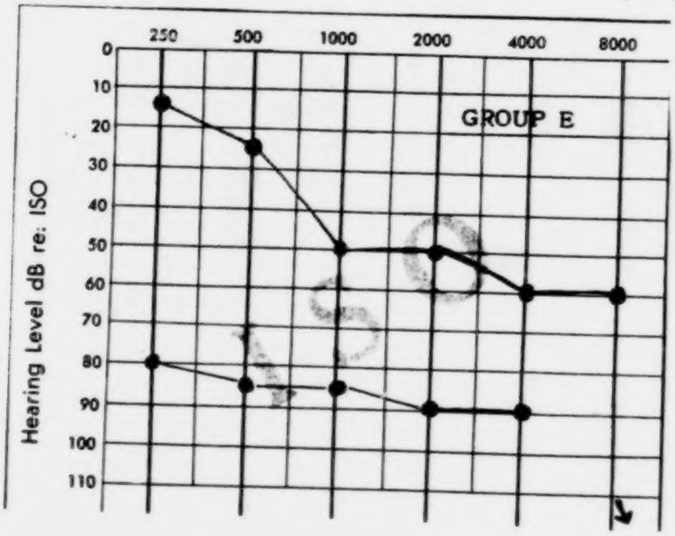


TABLE 5

NUMBER OF MONTHS OF AMPLIFICATION PRIOR TO INCLUSION OF THE 71 HEARING IMPAIRED SUBJECTS IN THIS STUDY

Group	N	Months of Amplification			
		0-12	13-24	25-36	37-42
A	8	2	6	0	0
B	18	7	9	2	0
C	18	5	7	6	0
D	19	8	3	7	1
E	8	4	1	3	0

of that department. Figures 1 and 2 present photographs of this "nursery school"-television studio. The photographs were taken looking down into the set, one from each side of the studio, and are included to provide graphic representation of the studio employed for the experimental sessions reported in later portions of this report.

Play Area

From these photographs, it can be seen that the shape of the studio was octagonal. It had no roof which allowed three microphones (RCA HK-97) to be suspended from the ceiling, six feet from the floor of the studio. The microphones were situated so that every area within the enclosed area could be covered for sound recording purposes. The studio was painted pale blue, a color selected to allow for maximum light reflection without a concomitant glare. Decals of clowns and other child oriented objects were placed on the walls to make the studio as cheerful as possible. The studio was carpeted with indoor/outdoor dark blue tiles for sound absorbing purposes. The door of the studio was situated so that each child could step directly into the play area from the hallway leading to it.

Videotape Camera Arrangement

Inserted into two of the walls of the octagon were one-way windows (Libby Owens, Beam Splitter #405). They were situated to allow for complete coverage of all playing areas possible within the enclosed studio. Behind each of the one-way windows was a videotape camera (Raytheon 705) installed on an adjustable tripod. To decrease the amount of light transmission through the one-way

FIGURE 1

PHOTOGRAPH OF THE TELEVISION STUDIO TAKEN FROM
THE UPPER RIGHT HAND CORNER

FIGURE 2

PHOTOGRAPH OF THE TELEVISION STUDIO TAKEN FROM THE UPPER LEFT HAND CORNER window, each camera was encased in a "room", whose walls consisted of black drapes. These drapes significantly reduced the amount of glare present behind the windows. To remove all possible indications of anything being present behind the windows, however, all metal surfaces on the camera were painted black. As an added precaution, the cameramen were requested to remove all shiny objects on their person including rings and belt buckles and to wear dark, preferably black, clothes when recording.

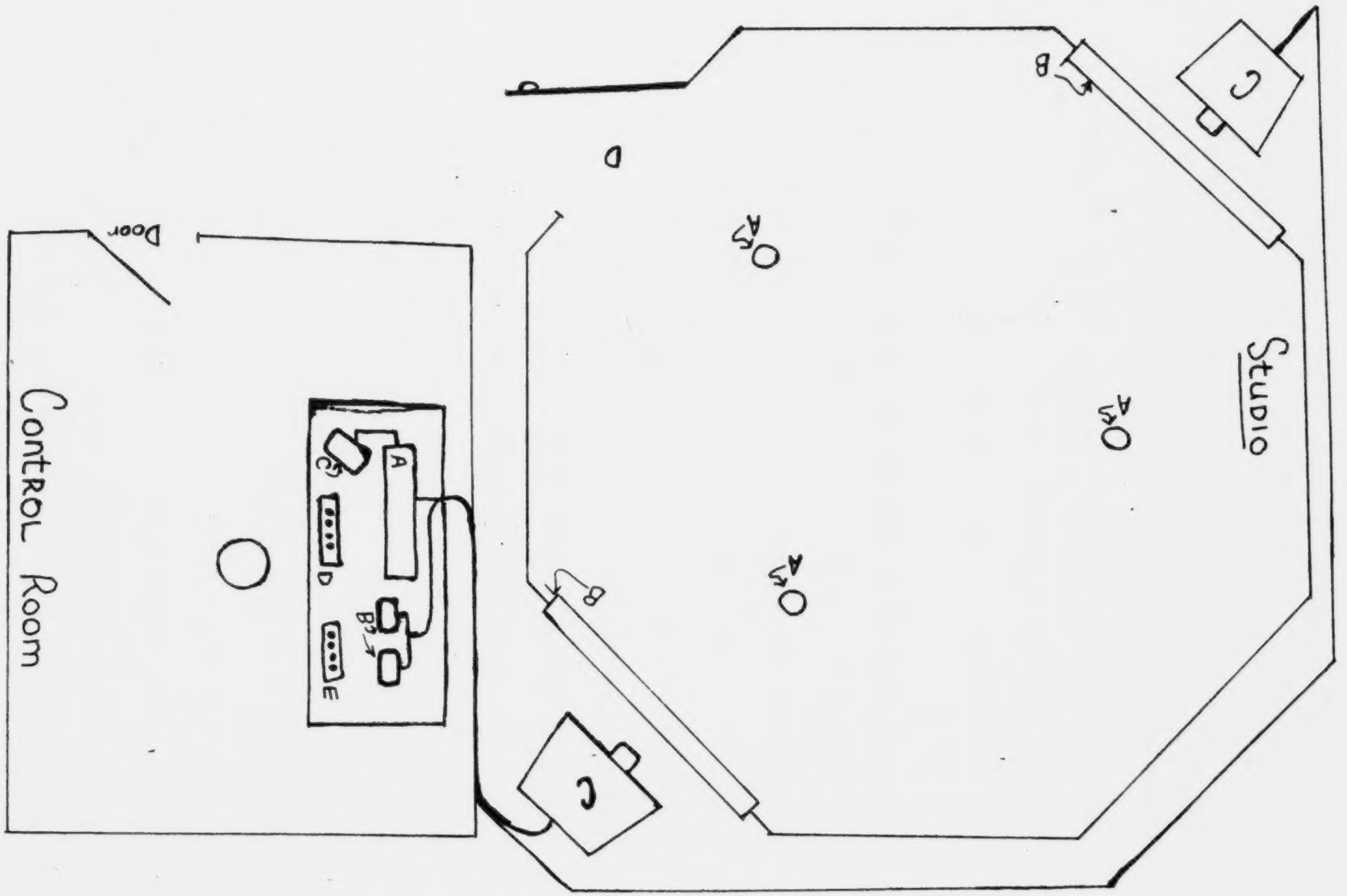
Videotape Recording Apparatus and Arrangement

Figure 3 presents a schematic drawing of the arrangement of the connection between the videotape cameras and recording apparatus. As can be seen, the complete filming unit consisted of a suite of two rooms. One room was the play area with its videotape camera arrangement and the other was the control room from which all final recording of the data was coordinated.

The videotape message from the play area was fed into a videotape recorder (Sony EV 210). Each camera was connected independently to the recording apparatus so that switching between cameras to allow for maximum coverage of all activities occurring within the television studio was possible. In addition, a Shuremie sound mixer allowed for control of sound input onto the videotape recordings. This sound mixer arrangement accepted messages from either or all of the microphone outlets, which could be fed onto the videotape recording in any combination desired. Under most filming conditions, the mixer was set so that simultaneous transmission from all microphone outlets could be obtained.

FIGURE 3

SCHEMATIC DRAWING OF TELEVISION STUDIO ARRANGEMENT


Studio
A
A
A
B
B
C
C
D
Door
Control Room
A
B
C
D
E

KEY TO FIGURE 3

Television Studio:

A: Microphones (RCA HK-97) suspended from the ceiling of the studio.

B: One-way windows (Libby Owens, Inc., 24 x 36 x 1/4; Beam Splitter Coater #405).

C: Videotape cameras (Raytheon 705).

D: Door leading from the hallway into the studio.

Control Room:

A. Main monitor (Carlson 2100 SD).

B. Subsidiary monitors (Sony PV 510), one attached to each of the videotape cameras.

C: Videotape recorder (Sony EV 210).

D: Microphone monitor (Shuremie Mixer).

E: Camera switcher (Dynair).

Procedures for Selection of Toys

Contact with two nursery school teachers certified to work with normally hearing nursery school aged children and one nursery school teacher with experience working with handicapped children including the hearing impaired was made for purposes of outfitting the television studio with a selection of toys appropriate for children from the ages of three to six years. Because of space and technical limitations, certain categories of toy equipment were not considered for inclusion in the test materials. Live animals were not included for reasons of maintanece. Large muscle toys such as tricycles were not considered because of the limited space afforded by the play area. Games or toys with many minute pieces were avoided since precise videotape coverage of such toys would have been difficult.

Description of Toys

Table 6 provides a list and short description of the toys finally decided upon as the stimulus items for this project. Figure 4 presents a schematic drawing used by the research staff to determine replacement of the toys after each taping session had been completed. Figures 5 through 10 presents photographs of the major placement groupings prevalent in the play area.

As can be seen, the toys represented categories presumed to be appealing to both boys and girls. They were grouped into categorical areas for ease of replacement and ease of room arrangement.

Videotaping Procedures

Each subject was brought into the studio by a member of the

TABLE 6

LIST AND DESCRIPTION OF THE TOYS INCLUDED IN THE TELEVISION STUDIO

Kitchen Area

Child-sized sink: 12" deep x 28" long x 24" long in natural finish
Child-sized cupboard: 12" deep x 18" long x 43" high in natural finish
Tabletop ironing board with wooden iron: 31" long x 7 1/2" wide x 5" high in natural finish
Child-sized refrigerator: 12" deep x 18" long x 37" high in natural finish
Child-sized single stove: 12" deep x 16" long x 24" high in natural finish
Housecleaning set: six child-sized pieces including corn broom, wet mop, dry mop, metal dustpan, dust brush, and push broom
Aluminum cutlery set: 18 pieces consisting of six forks, six spoons, and six knives with plastic organizer
Child-sized pots and pans
Aluminum tea set: a set consisting of six cups, six saucers, six plates, a tea pot, a creamer, and a sugar bowl
Child-sized carpet sweeper
Child-sized table with two accompanying chairs: 30" deep x 20" high in natural finish
Pop up toaster in natural finish

Doll Corner

Child-sized doll bed: 16 1/2" wide x 31" long x 10" high in natural finish
Doll bedding
Sasha doll: doll having umber skin color to represent a composite of many nationalities 16" tall
Gregor doll: male doll comparable to Sasha 16" tall
Bendi-Baby: Caucasian doll with moveable limbs 10" tall
Bendi-Baby: Negro doll with moveable limbs 10" tall
Doll clothing suitable for each of the above dolls
Raggedy Ann: female cloth doll 24" tall
Raggedy Andy: male cloth doll 24" tall

Chalk Board Area

Chalk board: 24" long x 36" high in green finish
Chalk
Eraser

TABLE 6 - Continued

Other

Wooden building blocks: 185 blocks of 22 different shapes in natural finish
Foam rubber building blocks: 125 blocks of two different shapes
Wooden airplane in natural finish
Wooden airplane with moveable propeller in natural finish
Wooden helicopter with moveable propeller in natural finish
Shape sorting box: 7" cube box with hinged top with five different shaped holes in which to place 15 blocks
Jig saw puzzle representing a cat
Jig saw puzzle representing a dog
Assorted set of plastic dress-up hats: a straw hat, a fire hat, a workman hat, a cowboy hat, an explorer hat, and a top hat
Snare drum: 12" in diameter
Pan balance scale: 33" long x 22" high with two 7" pans suspended from either end of the arm by a chain.
Two pull toys representing Busy Bee and Choo-Choo Train
Assorted stuffed animals 10" high: a cat, a rabbit, a dog and a bear
Assorted Tonka vehicles ranging in length from 8" to 16": a Volkswagon, a dump truck, a wrecker, a bull dozer, a crane, and a fire engine

FIGURE 4

SCHEMATIC DRAWING OF TOY PLACEMENT IN PLAY AREA

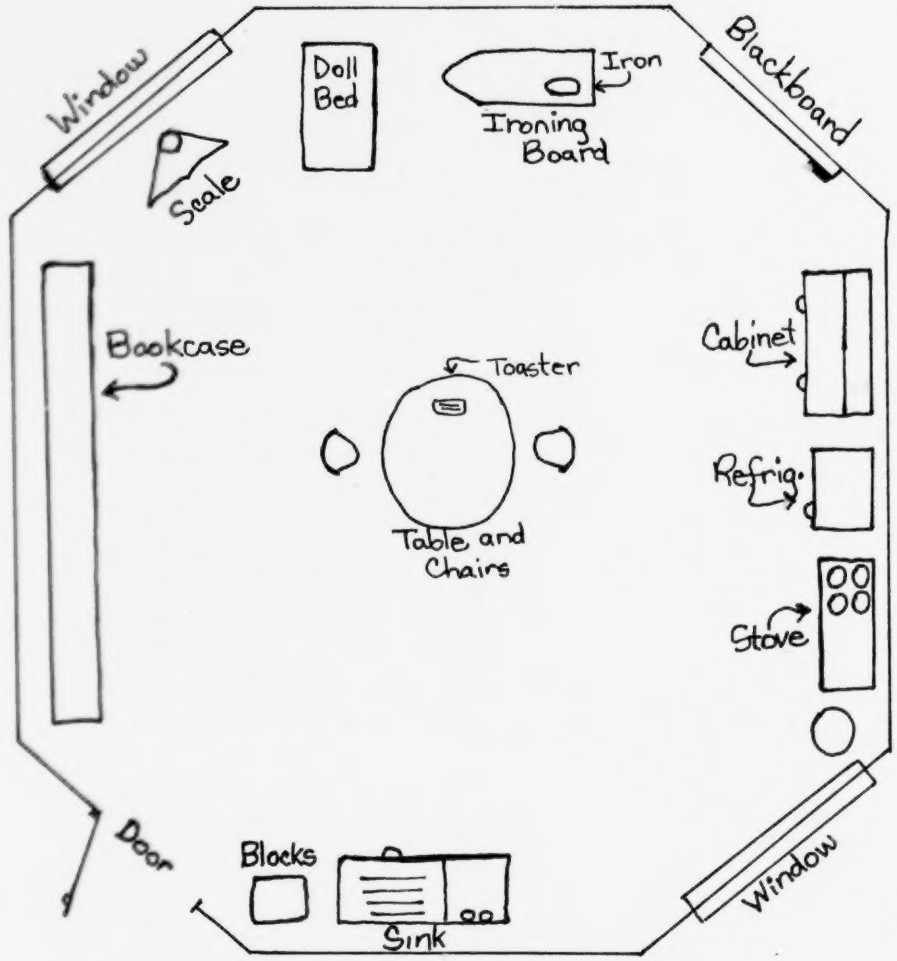
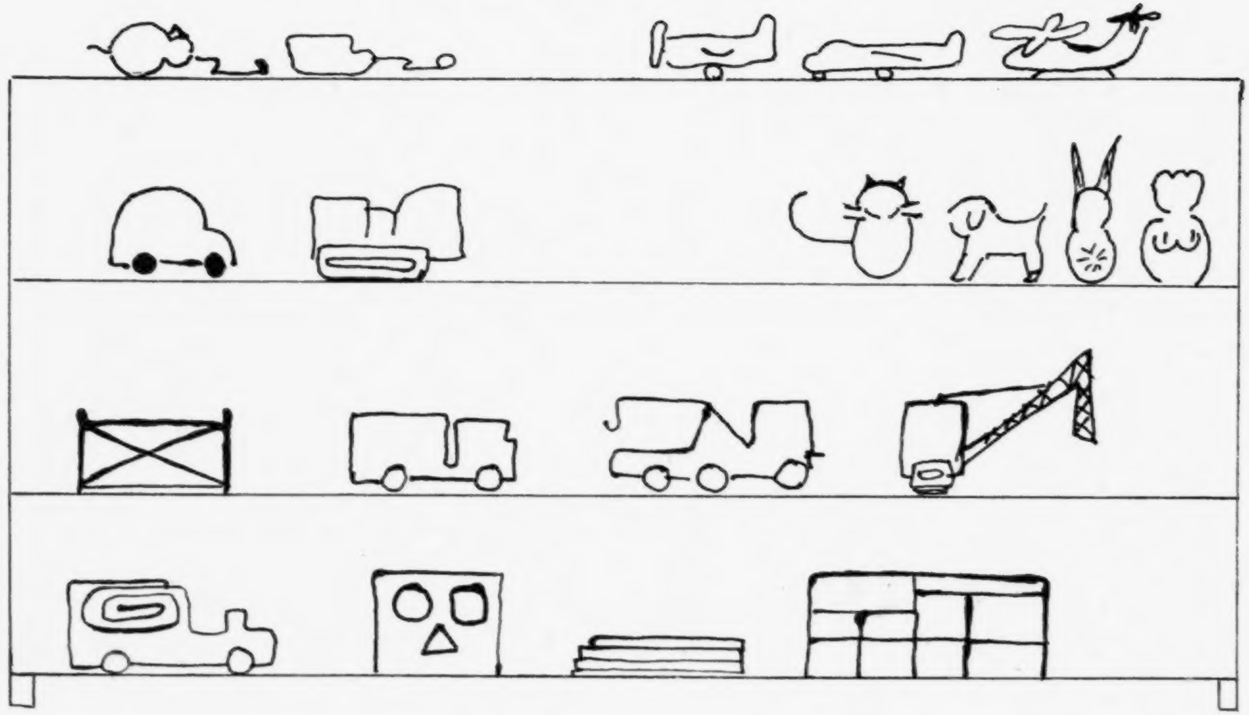

Window
Doll Bed
Iron
Ironing Board
Blackboard
Scale
Bookcase
Toaster
Cabinet
Table and Chairs
Refrig.
Stove
Door
Blocks
Sink
Window

FIGURE 4 - Continued



BOOKCASE

KEY TO TOY ARRANGEMENT ON BOOKCASE

Shelf 1

From left to right, Busy Bee, Pull Train Toy, Airplane with Propeller, Airplane without Propeller, and Heliocopter.

Shelf 2

From left to right, Volkswagon, Bull dozer, Stuffed Cat, Stuffed Dog, Stuffed Rabbit, and Stuffed Bear.

Shelf 3

From left to right, Drum, Dump Truck, Wrecker, and Crane.

Shelf 4

From left to right, Fire Engine, Puzzle Box, Assorted Puzzles, and Foam Blocks.

FIGURE 5

WIDE ANGLE VIEW OF ENTIRE TELEVISION STUDIO

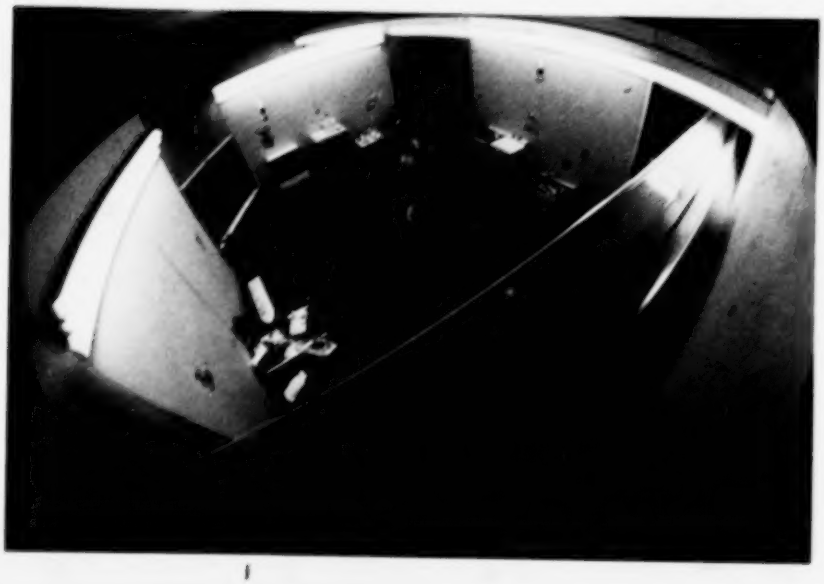


FIGURE 6

VIEW TAKEN FROM CAMERAMAN #1 POSITION

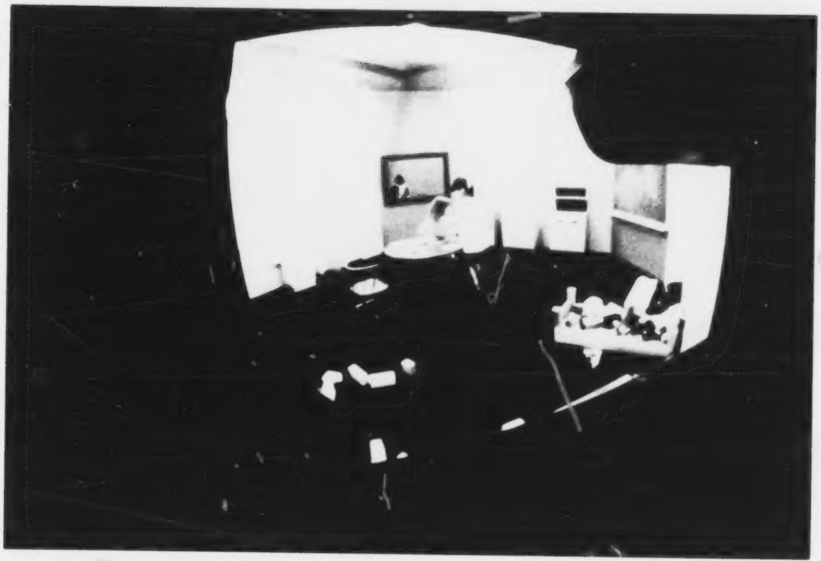


FIGURE 7

VIEW TAKEN FROM CAMERAMAN #2 POSITION

FIGURE 8

VIEW OF BOOKCASE AREA

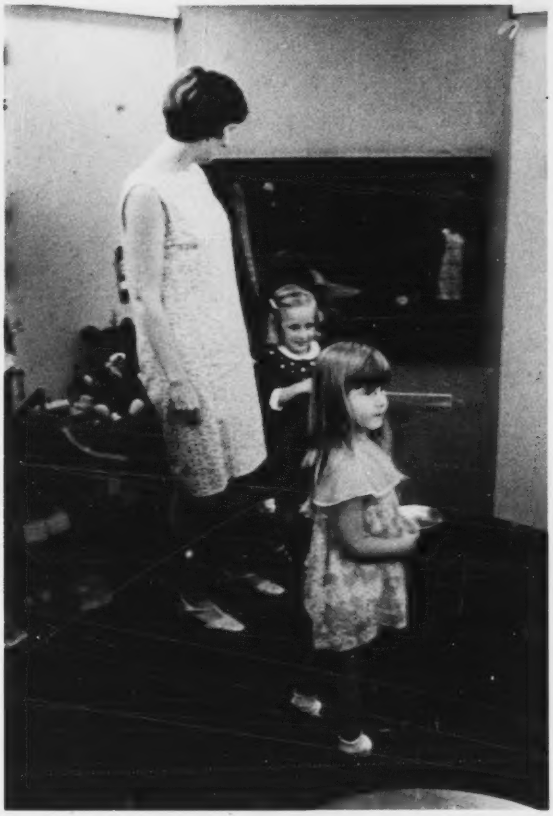


FIGURE 9

VIEW OF CHALKBOARD AREA

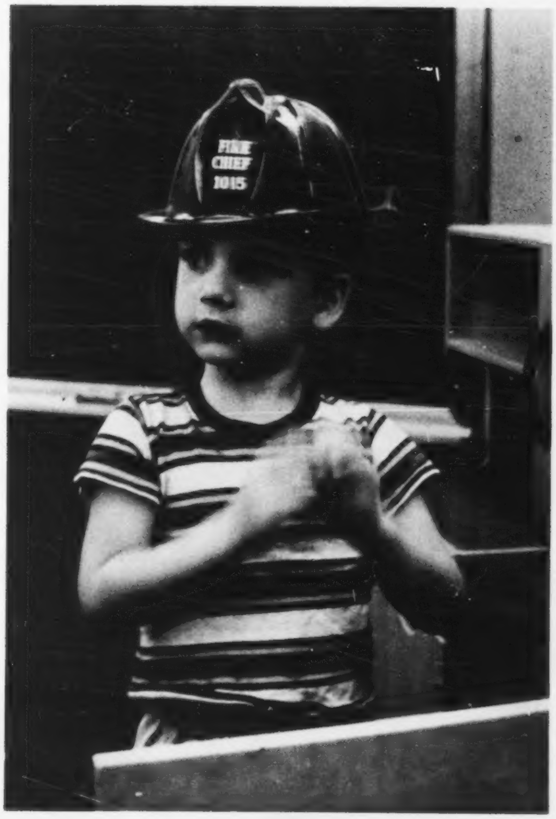
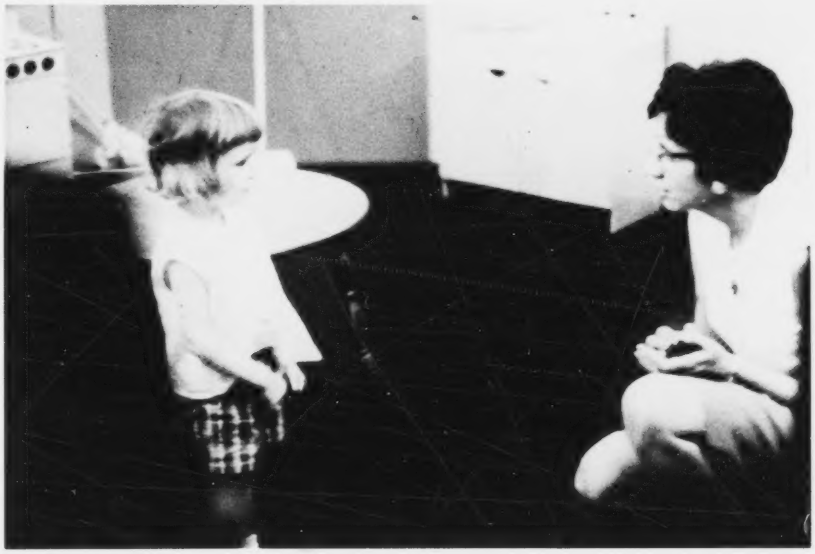

FIRE
CHIEF
1015

FIGURE 10

VIEW OF SINK AREA



research team and was left to play. The child was told to do whatever he wished and that someone would be returning after awhile to return him to his parent. For normally hearing children speech was used to relay this information to the child. For the hearing impaired children speech, gestures, and in some cases, manual communication were employed. The child was not left alone until it was felt that he or she understood what was expected of him or her. Once this point was reached, the research staff member left the child alone in the television studio. In no instance did a normally hearing child pose a problem. In seven instances it was necessary to return to a hearing impaired child who had become frightened which caused him to cry, scream, or make attempts to leave the filming area. For these children, the adult who had introduced the child into the test room returned and attempted to reassure the child by re-explaining what was expected. After a period of comforting, four of the hearing impaired children responded and willingly began to play when left alone for a second time. In the other three cases, it became necessary to include the adult in the filming session. In these cases the adult was seated on a chair placed between the sink and box of wooden blocks (see Figure 3) and instructed to remain passive and non-responsive to any communication overtones made by the child. As a consequence, the seated adult constituted another variable for these three children's play sessions. Although some visual contact was made with the seated adult, there was no attempt, on the part of any of the three children, to interact directly with the accompanying adult. Because of the nature of the study and the small effect this variation was considered to have, it was decided to include these children, with their paired matches, in the remainder of the study.

Each subject was left in the test situation for precisely fifteen minutes. Each of the cameras was operated by a cameraman familiar with television filming techniques. Through means of a talk-back system connecting the cameraman to the control room, the director was able to instruct the cameramen as to the desired angles and pictures required to best portray the ongoing play activity being displayed by the child. Under all filming conditions, the project director acted as the director and it was his decision as to which picture, from which camera would be recorded onto the videotape. It was these tapes, 142 in number, that constituted the raw data for the remainder of this project.

Scoring Procedures

Development of the Activity Dimension Scoring Procedure

To evolve a scoring procedure meaningful to the objectives of this study, a pilot project was initiated for the purpose of designing and validating a procedure to describe the quantity and quality of play activities occurring within the experimental environment.

The pilot project sample consisted of individual films of five normally hearing and five hearing impaired children ranging in age from three to six years. The subjects used for this pilot project were not included in the larger study. Videotaping of these children, however, proceeded under conditions comparable to those used during the experimental phase.

Each of the ten tapes was reviewed independently by two members of the research staff. The task required of them while viewing the tapes was simply to dictate what they saw happening. It was agreed beforehand that all activities noted, as well as the objects engaged, would be recorded by using descriptive terms that would be easily understood by a casual observer. Examples of these protocols are included in Appendix B.

Upon completion of this task, all verbs used in the twenty protocols were listed separately with their frequency of occurrence also noted. Having accomplished the descriptive task, the two viewers defined through mutual discussion as precisely as possible the verbs they had employed. Many of the verbs listed were eliminated or combined with other items to avoid redundancy when describing the experimentally elicited behaviors. From these discussions, there emerged a scoring form, hereafter referred to as the Activity Dimension Scoring Sheet. A final copy of this form is included in Appendix C of this report.

Description of the Activity Dimension Scoring Procedure

Four general categories of behavior emerged from evaluation of the activity dimension, namely, Locomotion, Handling, Interaction with Self, and Interaction with Objects.

The Locomotion category included any physical movement around the studio such as walking, skipping, running, or any physical positioning of the body such as sitting, stooping, bending over.

The Handling behaviors included those terms relating to any mechanical manipulation of objects. Terms such as *picked up*, *put down*, and *touched lightly* are descriptive of this general category.

The *Interaction with Self* category consisted of those terms relating to physical contacts with one's own person, as well as any attempts at vocalization.

The last category, *Interaction with Objects*, was an attempt to record all activities involving interaction with objects contained within the play area. Behaviors subsumed under this category of interaction included more mechanical activities such as *looked at* or *opened* experimental objects, to the more creative aspects of play, namely, imaginative play and problem solving activity.

To summarize, the first three behavior categories of *Locomotion*, *Handling*, and *Interaction with Self*, as well as portions of the fourth category, *Interaction with Objects*, could be considered representative of the more mechanical operations possible within the experimental situation, whereas the remaining portion of the *Interaction with Objects* category represents the most creative aspects of play behavior.

Reliability of the Activity Dimension Scoring Procedure

In an attempt to ascertain the reliability of the Activity Dimension Scoring Procedure, two research assistants were employed. Both were graduate students from the area of Speech Pathology and Audiology at the University of Cincinnati. They were selected because of their unfamilarity with the material contained within the project. It was reasoned that if these unsophisticated research assistants could be trained to consistently identify similar types of behaviors, it would be appropriate to assign different tapes from the 142 samples of videotapes to each of the assistants for rating purposes. Without such confirmation each tape would have to be rated by a single researcher, which would be a rather difficult, indeed monumental, task. The training period which required about six weeks consisted of three one and one half hour sessions per week. The training tapes employed were the same ones used to evolve the Activity Dimension Scoring Procedure.

After it was felt that sufficient conformity was obtained between the raters, a random sample of five pairs of videotapes from the 142 experimental videotapes was made, which were independently rated by these two research assistants. The results of rater comparability for the Activity Dimension Scoring Procedure are presented in Table 7. As can be seen from these results, there was fair to good reliability between the two assistants on all four categories, which seems to justify assigning equal numbers of the 142 videotapes to each for final rating. As would be expected, the best reliability scores were achieved on those categories which reflected the more mechanical aspects of play since description of activity behaviors required few qualitative judgements but rather mere enumeration of their appearance or non-appearance on the tape. The category representing the more creative activities produced the greatest disparity in reliability results, but even these results were not so divergent as to cast doubt on the ability of the two research assistants to perceive comparable types of behavior.

TABLE 7

RELIABILITY SCORES BETWEEN TWO RATERS EMPLOYING THE ACTIVITY DIMENSION SCORING PROCEDURE

Category	Percentage of Agreement Score
Locomotion	.98
Handling	.96
Interaction with Self	.86
Interaction with Objects-Mechanical Aspects	.87
Interaction with Objects-Creative Aspects	.82

Scoring of the Experimental Tapes - Activity Dimension

One half of the 142 tapes was randomly assigned to each of the two research assistants, so that each was required to evaluate a total of 71 tapes. It was these final ratings, which constituted the Activity Dimension data employed in all statistical treatments reported in the remainder of this report.

To facilitate the rating process, each of the 142 tapes were divided into fifteen second segments with ten seconds of blank tape intervening. It was ascertained empirically that fifteen seconds of viewing constituted about the maximum amount of information that could be processed reliably. Repeated viewing of any given fifteen second interval was permissible to guarantee complete and accurate rating of the material.

Development of the Object Dimension Scoring Procedure

In addition to describing activity of each subject all objects engaged by each child within the fifteen minute test period were also enumerated. The list of all possible objects contained within the television studio constituted the Object Dimension Rating Scale. (see Appendix D)

Preliminary evaluation of the Object Dimension Rating Scale was also done by using the ten pilot project videotapes. The research assistants were asked to identify and tabulate every engagement of an object and its frequency of occurrence within each of the ten pilot project tapes. An engagement was defined as the time from initiation of physical contact with an object to physical relinquishment of that same object.

A training period of only one session for one hour in duration was necessary to establish comparable types of identifying behavior for the Object Dimension Rating Scale. Training consisted of identifying the occurrence of an engagement as well as listing the toy or other object engaged.

To evaluate rating comparability for the Object Dimension Rating Scale, randomly selected experimental tapes were utilized again. The two raters yielded a correlation of .94 on the Object Dimension Rating Scale, which can be considered indicative of good agreement between the two raters. Disagreements between the raters occurred only when there was question as to whether a particular child had momentarily touched an object or not.

Scoring of the Experimental Tapes - Object Dimension

Upon completion of the activity dimension ratings, each research assistant was asked to return to their respective tapes and enumerate the object engagements as well as the frequency of occurrence of each behavior for each of the fifteen second segments.

Summary

In summary, the experimental data used for all statistical treatment reported in this project consisted of ratings obtained on 142 subjects, 71 of whom were hearing impaired and 71 of whom were normally hearing, on two dimensions, namely, Activity and Objects Engaged. The ratings for both dimensions were accomplished independently by two research assistants. All experimental tapes were divided into fifteen second segments for ease of rating.

CHAPTER III

RESULTS AND INTERPRETATION

In reviewing the raw data generated for this project, several steps were followed. First, the activity dimension data were treated separately from those data obtained from the Object Dimension Scoring Procedure. Therefore, the results section has been divided into two parts showing first the results of the statistical and descriptive examination of the activity dimension and second, the results of the statistical and descriptive examination of the object dimension. Analyses of the data proceeded from a global to a more detailed analysis for each of the two dimensions, namely, activity and object. Accordingly, the results of all analyses have been presented in this sequence. Interpretation of these results has been included in this section of the report also.

Activity Dimension

Initial examination of the activity dimension data revealed that any parametric statistical analysis attempted on a minute by minute basis would be of questionable value due to the small number of data points within most category cells. In an attempt to obtain larger, more meaningful mathematical units, the raw data were grouped on a per minute basis under the four primary categories operationally defined on the Activity Dimension Rating Scale, namely, Locomotion, Handling, Interaction with Self, and Interaction with Objects. Even this compilation proved to be inadequate to generate data approximating a normal curve distribution, so further consolidation was performed with respect to time. Three time categories were set up to consolidate the minute by minute data, namely: initiation period, i.e. the time period of one minute to five minutes: maintenance period, i.e. the time period from six to ten minutes; and termination period, i.e. the time period covering the final five minutes of the individual test sessions. The values from each of these three time periods were separated into the four major activity categories designated on the Activity Dimension Rating Scale. Thus, each subject in the study yielded twelve activity dimension scores, four from each of the three five minute time periods.

Analysis of the Total Activity Performance of the Two Groups

Appendix E presents the means and standard deviations for each subject, for each of the four activity categories for the three time divisions established. An analysis of variance, using activity category, time, and hearing status as the independent variables, was performed. The results of this analysis of variance are presented in Table 8. As can be seen, the results indicate a significant difference at the .05 level of confidence on the hearing status variable, whereas the results of the activity and time variables exceeded the.01 level of confidence.

Examination of the data which generated these results appear to support the following conclusions:

1. The hearing impaired group exceeded the normally hearing group on the activity categories of Locomotion, Handling, and Interaction with Self during all time periods, whereas there was no con-

TABLE 8

RESULTS OF AN ANALYSIS OF VARIANCE ON THE ACTIVITY DIMENSION DATA OVER THE THREE TIME INTERVALS FOR THE HEARING IMPAIRED AND NORMALLY HEARING GROUPS

Variable	Sum of Squares	Df	Mean Squares	F
Hearing (H)	.3664	1	.3664058	4.08[a]
Activity (A)	66.3841	3	22.1280413	246.86[b]
Time (T)	15.2517	2	7.6258971	85.07[c]
H x A	.2663	3	.0887959	.99
H x T	.1814	2	.0907053	1.01
A x T	4.8196	6	.8032770	8.96[d]
H x A x T	.1050	6	.0184171	2.05
S (HAT)	150.5903	1680	.0896370	

[a] At .05, F = 3.84

[b] At .01, F = 3.78

[c] At .01, F = 4.61

[d] At .01, F = 2.80

sistent difference between the two groups on the category of Interaction with Objects. In other words, the hearing impaired children moved about the room, handled objects, and stimulated themselves more often than did the normally hearing children.

2. In terms of activities, the order of highest performance for both groups was as follows: Handling, Locomotion, Interaction with Objects, and Interaction with Self. The more mechanical aspects of the situation such as physical activity and manipulation seemed to predominate in the behaviors which both sets of children exhibited. In other words, actual interaction with toys on a creative basis was less predominant than activities reflecting more non-creative motivations.

3. In relation to time, there was a dramatic decrease in the amount of Handling, Locomotion, and Interaction with Self activities occurring over time within both groups of children. This decrease in behavior was particularly noticeable between the second five minute period and the last time period. Interaction with Objects showed, on the other hand, a degree of stability from one five minute segment to the next.

Discriminate Analysis of Individual Performance

In an attempt to identify either hearing impaired or normally hearing children who might have deviated significantly from the remainder of their group with respect to overall level of performance, a discriminate analysis was performed on each group's data as generated by the Activity Dimension Scoring Procedure. To perform this analysis, no differentiation was made between the four activity categories, so that each child had a single score, namely, the total amount of activity produced over the entire fifteen minute

TABLE 9

DISCRIMINATE ANALYSIS CLASSIFICATION MATRIX FOR BOTH GROUPS OF SUBJECTS

FUNCTION	1	2	TOTAL
GROUP			
Hearing Impaired	48	23	71
Normally Hearing	30	41	71

test session. The individual subject results are presented in Appendix F, whereas the classification matrix resulting from this analysis is presented in Table 9.

The data obtained indicated that the hearing impaired group was a more homogenous group than was the normally hearing group. Of the 71 hearing impaired children, only twenty-three deviated significantly from the total performance level of the hearing impaired group, whereas thirty hearing impaired children deviated from their group's normative profile. Examination of the identifying information of the normally hearing subjects who constituted the deviant class did not reveal any apparent patterns which would explain the cause (s) of their deviancy. That differences did exist within the normally hearing sample with respect to total activities performed is clear, but determination of the reason or reasons for this divergency could not be made at this time.

Among the hearing impaired children, on the other hand, there was an inordinately large number of females of the twenty-three hearing impaired children who constituted the deviant sample. Other than sex, no other characteristic was apparent which might explain further the differences in performance within the hearing impaired sample.

Factor Analytic Solution of the Activity Dimension Data

In an attempt to ascertain any patterns in the activity dimension which might characterize the play behavior of either or both of the experimental groups, the total activity dimension data were subjected to a factor analytic solution. Appendix G presents the percentage of variance accounted for by each factor identified in this statistical treatment. In spite of the massive number of factors generated, examination of the results did not reveal any identifiable patterns which could be considered to characterize either group's activity dimension behavior.

Factor analytic solutions are usually applied to data to develop descriptive statements regarding the patterns and frequency of occurrence of the behaviors studied across all experimental subjects. In this case, application of factor analytic techniques did not generate definitive factors primarily because the number of data points for many of the categories was too small to yield valid correlations.

Further consideration of the factor analytic solution results suggested that absence of definitive factors was neither unexpected nor disappointing. In fact, it became clear that rather than looking at the number of times a particular activity occurred across all experimental subjects, it would be more productive to compare the number of hearing impaired children who had performed an activity at least once against the number of normally hearing children who had done likewise. Such descriptive statements might yield information about patterns of behavior characteristic of either group's activity dimension performance, which was not found by factor analytic solution approaches.

Summary of the Statistical Analyses of the Activity Dimension Data

From a review of the results of the statistical analyses performed on the data generated by the Activity Dimension Scoring Procedure, it is clear that a quantitative difference in activity level did exist between the groups. However, it was not possible to ascertain all the qualitative differences that existed due to the limited number of data points that existed within the categories examined and the inappropriateness of asking quantitative questions about the occurrence and non-occurrence of particular tasks.

Descriptive Analysis of the Activity Dimension Data

In an attempt to obtain a clearer picture of the behaviors exhibited by the two groups of children, it was decided to do a minute-by-minute analysis of each of the seventy sub-categories represented on the Activity Dimension Rating Sheet for both experimental groups. It was decided that the number of occurrences of a particular act within a given minute segment would not be emphasized, but rather the number of children, either hearing impaired or normally hearing, who performed the act within a given minute period. In this way it was hoped that patterns of behavior might be noted for the two groups.

For each category during each minute period, the number of hearing impaired and normally hearing children performing a particular act was tallied. This procedure yielded thirty scores per activity sub-category, fifteen for the hearing impaired and fifteen for the normally hearing, two scores at each minute segment. Tables 10 through 13 present the number of children by hearing status who performed each act during each of the fifteen minute segments.

Locomotion

An examination of Table 10 suggests the following trends.

Non-intentional Movement

In each time segment, the hearing impaired children exceeded the normally hearing children in the total number of non-intentional locomotion acts performed.[1] There were more hearing impaired children than normally hearing children who moved about the room with little apparent intent or direction in mind. In addition, there was a clear decrease in the number of normally hearing children exhibiting non-intentional movement over time, when compared to the hearing impaired sample.

Intentional Movement

In contrast to this trend involving non-intentional movement, the normally hearing group consistently exceeded the hearing impaired at each time segment, except for the last three minutes, in the number of intentional movements performed within the play environment.[2] However, it should be noted that as with non-intentional movement, intentional locomotion decreased with time for the normally hearing group.

Standing

Related organizationally to the former two locomotion subcategories is standing without movement. As with the non-intentional movement locomotion category, the hearing impaired tended

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[1] Non-intentional movement is here defined as movement other than from one definite point within the television studio to another.

[2] Intentional movement is defined as moving from one definite point within the television studio to another.

TABLE 10

SUMMARY OF EXPERIMENTAL SUBJECTS LOCOMOTION BEHAVIOR FOR EACH TEST MINUTE
(N = 142)

Minute	Locomotion Sub-Category											
	Moving-General		Moving-Specific		Sitting		Standing Without Movement		Laying		Leaving Room - 1	
	D	H	D	H	D	H	D	H	D	H	D	H
1	58	22	42	47	30	35	46	45	1	4	1	1
2	51	23	49	61	22	30	43	40	2	4	0	0
3	50	18	43	54	29	31	42	39	4	4	2	0
4	55	21	47	53	18	27	42	38	2	5	4	5
5	56	23	52	55	18	27	44	42	5	6	3	4
6	58	17	48	52	21	32	43	36	5	7	1	3
7	50	18	41	50	24	24	42	33	3	9	2	2
8	44	14	41	49	19	29	39	33	4	10	0	1
9	43	16	40	46	22	36	39	38	3	6	2	3
10	41	14	41	44	15	23	37	35	3	3	1	7
11	34	14	41	44	12	19	39	39	0	8	0	2
12	26	12	34	36	6	15	37	30	0	6	0	0
13	38	10	34	32	5	26	38	25	0	12	0	2

TABLE 10 - Continued

Minute	Locomotion Sub-Category											
	Moving-General		Moving-Specific		Sitting		Standing Without Movement		Laying		Leaving Room - 1	
	D	H	D	H	D	H	D	H	D	H	D	H
14	36	11	31	30	3	29	43	20	1	16	0	0
15	32	7	36	30	0	22	36	17	0	21	0	0

	Leaving Room - 2		Stooping		Bending Over		Crawling		Dancing and Jumping	
	D	H	D	H	D	H	D	H	D	H
1	6	2	48	38	16	28	6	9	2	2
2	7	5	34	23	13	33	6	9	1	2
3	3	0	37	31	9	18	5	17	2	2
4	4	0	45	23	13	13	10	21	4	0
5	2	0	47	27	12	15	5	17	1	3
6	7	0	31	24	11	11	10	11	3	1
7	4	0	39	32	9	18	8	13	1	0
8	5	0	28	25	9	12	5	13	2	3
9	4	0	29	27	9	10	9	13	1	4
10	5	0	23	19	10	18	7	11	1	3
11	4	0	31	24	9	16	5	10	0	2

TABLE 10 - Continued

Minute	Locomotion Sub-Category									
	Leaving Room - 2		Stooping		Bending Over		Crawling		Dancing and Jumping	
	D	H	D	H	D	H	D	H	D	H
12	6	0	26	16	6	11	3	6	1	1
13	3	0	28	18	5	18	0	8	0	1
14	5	0	23	16	10	20	0	11	2	2
15	4	0	25	12	3	15	0	5	1	2

to exceed the normally hearing in the number of children who stood motionless, but the differences between the two groups were not as great as for the non-intentional movement locomotion sub-category. Again, there was a decrease over time in the number of children who just stood, especially for the normally hearing group. From these results and those of the previous locomotion sub-categories, it could be hypothesized that standing without movement served as a time for organizing behavior. In other words, the child while locomoting would stop moving to organize himself for the next locomotion act to be performed. It would seem that the normally hearing children were able to profit more from this organizing step than were the hearing impaired since more intentional movement locomotion was observed for the normally hearing sample than for the hearing impaired sample.

Sitting, Laying, and Crawling

The normally hearing group tended to exceed the hearing impaired group in those categories which were sedentary in nature. For the sitting sub-category, the hearing impaired and normally hearing groups began at essentially the same point, but over time, the hearing impaired group showed approximately the same number of children performing this act, whereas the normally hearing group increased in sitting locomotion behavior.[3] The same trend toward increased performance over time in sedentary pursuits among the normally hearing children was also apparent in the laying sub-category. Laying was scored only if the child made contact with the floor with both his hips and elbows.

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[3] Sitting here refers to sitting either on the floor, or on some article in the television studio, i.e. chairs.

In the crawling category, a locomotion category scored if contact with the hands and knees is made with the floor, the normally hearing children as a group had more contact with the floor than did the hearing impaired. The number of hearing impaired children who crawled was greater than the number of hearing impaired children who laid suggesting that even if contact was made with the floor, the hearing impaired activity level was still great.

Leaving

The hearing impaired group attempted more departures and actually left the experimental situation more often than did the normally hearing children. Review of the videotapes clearly indicated that the two sub-categories, attempting to leave and actually departing, were mutually exclusive categories in that a particular child would either leave the room or only make attempts to leave, such as opening the door, within a given time segment. If the reader can accept the premise that escape from the experimental play area may have demonstrated fear of the situation, it could be reasonably hypothesized that as a group there were more hearing impaired children fearful of the experimental situation than there were normally hearing children. However, for both groups of children, the number of subjects whose efforts fell in either escape sub-category was small, demonstrating the willingness of most of the subjects to tolerate being left in the test situation unaccompanied by supervising adults.

Stooping and Bending Over

There was a difference between the two groups in the number of children performing stooping and bending over activities. In both instances, there was a decrease of such activities over time. The normally hearing children tended to stoop, whereas the hearing impaired group tended to bend over.[4] Stooping or squatting behavior placed the subject in a position which was conducive to interaction with most of the toys and play equipment available, whereas bending over did not provide as much opportunity for interaction with the majority of toys. For instance, in order to reach the toy items placed on the bottom shelf of the bookcase, the child had to bend his knees or stoop if he wanted to reach them. From this, it would seem that more normally hearing children were willing to place themselves into physical positions which allowed for maximum interaction with most play equipment contained within the television studio.

Summary on Locomotion Categories

In conclusion, the following constellation of behaviors seem to best characterize each group's locomotion activity:

Hearing Impaired Group: The hearing impaired as a group were a locomoting group whose movements were primarily non-intentional in nature. They exhibited a minor tendency to attempt to escape from the experimental situation. They did not indulge heavily in locomotion activities which would place them in positions closer to or on the floor. This often resulted in fewer numbers of hearing impaired children who had ready access to all toys and play equipment available within the experimental play area.

Normally Hearing Group: Like the hearing impaired group, the normally hearing children were active, moving about the television studio quite freely, but most of this movement was identifiable as intentional movement from one specific object to another within the experimental environment. As a group, normally hearing children did not exhibit as many attempts to depart from the test situation as did the hearing impaired children. If such an attempt was made by a normally hearing child, it was usually one of proposing to exit such as opening the door, rather than actually departing from the television studio. Lastly, normally hearing children exhibited more of a tendency to engage in activities placing them closer to or on the floor, which gave them ready access to a majority of the play equipment.

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[4] To qualify as stooping behavior, the child had to be observed as bending the knees and sitting on his heels, while bending over behavior implied a movement at the waist.

Handling Behavior

Table 11 summarizes the Handling behavior of the normally hearing and hearing impaired subjects.

Put Down and Pick Up

In spite of the hearing impaired children's predisposition to place themselves into positions that were not conducive to play interactions with many of the experimental toys, there did not appear to be any great difference in the number of hearing impaired children and normally hearing children who actually picked up play objects. However, this conclusion must be qualified in that there were differences which commented on the nature of the interaction with the picked up toy. For instance, the number of children who picked up a toy and carried it for more than one minute segment before putting it down was consistently lower for the hearing impaired group than for the normally hearing group. This disparity would

TABLE 11

SUMMARY OF EXPERIMENTAL SUBJECTS HANDLING BEHAVIOR FOR EACH TEST MINUTE

(N = 142)

Minute	Handling Sub-Category													
	Picks Up		Puts Down		Puts Back		Drops Object		Throws		Catches		Carries or Holds	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
1	55	53	54	53	16	29	11	10	0	0	0	0	35	31
2	51	64	46	55	22	29	8	12	0	0	0	0	32	24
3	48	58	51	53	22	35	7	9	0	2	0	2	39	32
4	57	54	57	42	27	30	10	10	2	0	2	0	38	26
5	46	62	46	58	22	34	5	9	0	0	0	0	38	26
6	51	56	46	49	15	22	4	2	0	0	0	0	33	21
7	57	59	48	47	26	19	4	9	1	0	1	0	30	25
8	59	56	49	49	21	13	14	4	0	1	0	1	42	28
9	52	54	48	40	28	17	11	9	0	1	0	1	41	33
10	54	55	50	50	25	21	9	12	0	0	0	0	40	33
11	50	50	49	41	30	18	7	10	0	0	0	0	36	33
12	36	37	32	32	16	13	8	10	2	1	2	1	20	19
13	48	46	46	30	19	12	10	6	0	0	0	0	22	17

TABLE 11 - Continued

Minute	Handling Sub-Category													
	Picks Up		Puts Down		Puts Back		Drops Object		Throws		Catches		Carries or Holds	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
14	52	56	50	36	20	10	10	6	1	0	1	0	29	10
15	48	46	49	31	16	7	6	5	0	0	0	0	32	6

Minute	Pushes		Falls Off Objects	
	D	H	D	H
1	15	24	2	0
2	24	23	1	1
3	20	32	0	2
4	26	29	0	1
5	26	33	0	1
6	21	26	0	1
7	23	25	1	1
8	28	29	0	0
9	18	25	0	1
10	18	21	0	0
11	20	21	2	0

TABLE 11 - Continued

Minute	Handling Sub-Category			
	Pushes		Falls Off Object	
	D	H	D	H
12	12	14	2	0
13	15	20	2	1
14	12	25	0	0
15	8	29	0	0

seem to indicate that the normally hearing children tended to relate with toys over longer periods of time than did the hearing impaired group. In addition, it was noted that the number of normally hearing children returning play equipment to the same position was greater than the number of hearing impaired children during the initial four minutes, but that this trend reversed itself from the fifth minute on. It would seem, then, that the hearing impaired exceeded the normally hearing in "neatness". In other words, after the fourth minute, the normally hearing children tended to remove toy items and leave them elsewhere in the playroom, rather than returning them to their initial position. By virtue of the fact that the length of handling toys was longer and that the object was not returned to its initial position, the implication seems to be that there was greater opportunity for varied types of interactions with toys on the part of the normally hearing group than was true for the hearing impaired group. Lastly, it was found that the hearing impaired group tended to move about the studio with play equipment to a greater degree than did the normally hearing group during all minute segments. This finding coupled with the results reported under the Locomotion section as well as the other findings concerning picking up and putting down, suggests that transportation of play equipment was undertaken by hearing impaired children while roaming non-intentionally about the room. In contrast, the normally hearing children seemed to transport toys primarily while in a sedentary or crawling position or while intentionally moving from one point to another.

Pushing

The normally hearing group performed more activities designated as pushing than did the hearing impaired group. Since pushing toys such as cars is best accomplished on the floor, this finding would seem consistent with the previous findings reported for the Locomotion category.

Dropping and Falling

There did not seem to be any significant difference between the number of children from each of the two groups who either dropped objects or fell from play equipment such as chairs. There also did not appear to be a time factor in that there were equal numbers of children performing these activities over all minute segments. Both of these sub-categories can be considered as commentaries on general motor coordination. Thus, it might be concluded that there was no significant difference between these two groups of children in their ability to manipulate objects and to conduct themselves motorically within the experimental play situation.

Summary on Handling Categories

In conclusion, the following summary statements relative to the Handling activities for each of the two groups of subjects can be made:

Hearing Impaired Group: Hearing impaired children appear to pick up and put down objects within the same time segment. As verification of this statement, the specific data as to the number of pick ups and put downs for each group of children for each minute segment are presented in Appendix F. In addition, hearing impaired were seen to transport items more and to replace them in the same position from which they had been taken, the latter occurring particularly after the fifth minute of videotaping.

Normally Hearing Group: Normally hearing children picked up objects at the same rate as hearing impaired children, but did not seem as ready to replace or put down objects as were the hearing impaired children. Because normally hearing children did not, as a group, demonstrate much transporting activity, it can be concluded that they engaged play equipment more often while in a sedentary position. Such a conclusion gains support from the previous findings on the Locomotion sub-categories.

Interaction With Self Behavior

An examination of Table 12 suggests the following trends concerning the Interaction with Self sub-categories:

Touching and Looking at Self

The hearing impaired group contained more children during each minute segment who touched their body, clothes, and/or who looked carefully at themselves.[5] This touching and visual examination indicated a great interest in the self on the part of the hearing impaired group, which was greater than that of the normally hearing group. It is of interest to note that this interest in the self and articles of clothing did not decrease with time within the hearing impaired group, but did decrease with time in the normally hearing group. Accordingly, it could be hypothesized that different motivations occur in these two groups to produce this partic-

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[5] Looking at self involves both direct examination of the body, or looking at one's image in the mirrors located on either side of the television studio.

TABLE 12

SUMMARY OF EXPERIMENTAL SUBJECTS INTERACTION WITH SELF BEHAVIOR FOR EACH TEST MINUTE

(N = 142)

Minute	Interaction with Self Sub-Category											
	Touches Self		Touches Clothes		Looks at Self		Looks at Clothes		Mouthing		Humming	
	D	H	D	H	D	H	D	H	D	H	D	H
1	37	36	10	2	18	15	0	0	5	10	0	4
2	36	33	13	4	14	11	1	0	9	5	0	5
3	40	33	6	4	16	14	2	0	7	6	1	3
4	33	29	13	8	11	9	1	0	7	8	0	2
5	46	33	8	7	26	8	1	0	8	3	4	7
6	41	29	7	5	17	5	0	0	6	7	1	3
7	41	37	7	5	19	10	0	0	10	13	0	5
8	34	32	6	5	22	11	0	0	6	5	3	5
9	38	29	6	5	19	16	0	0	12	11	1	3
10	36	30	9	3	19	10	1	0	6	7	1	2
11	28	25	10	5	16	8	0	0	5	6	1	4
12	20	16	10	3	9	3	0	0	8	8	0	1
13	25	18	16	3	12	4	0	0	10	5	0	5

TABLE 12 - Continued

Minute	Interaction with Self Sub-Category											
	Touches Self		Touches Clothes		Looks at Self		Looks at Clothes		Mouthing		Humming	
	D	H	D	H	D	H	D	H	D	H	D	H
14	27	10	16	2	16	6	0	0	7	8	0	5
15	21	11	10	0	15	2	0	0	5	6	0	4
	Appropriate Sounds		Vocal Play		Distress Sounds		Random Sounds		Speech		Gestures	
	D	H	D	H	D	H	D	H	D	H	D	H
1	9	10	9	5	4	0	15	17	9	31	4	3
2	5	15	11	10	6	0	14	13	14	27	13	6
3	9	29	11	8	5	2	17	15	9	27	11	7
4	9	19	9	5	10	1	12	15	9	26	6	5
5	13	18	11	5	4	2	17	11	17	27	9	8
6	8	10	10	4	5	0	13	17	8	23	6	5
7	5	16	7	0	1	0	17	21	7	23	11	7
8	7	14	10	4	2	1	19	12	8	29	9	7
9	11	15	8	3	2	1	22	13	10	35	13	9
10	11	16	6	4	3	2	22	11	13	23	7	4
11	6	12	5	4	4	3	17	13	9	24	7	8

TABLE 12 - Continued

Minute	Interaction with Self Sub-Category											
	Appropriate Sounds		Vocal Play		Distress Sounds		Random Sounds		Speech		Gestures	
	D	H	D	H	D	H	D	H	D	H	D	H
12	3	18	5	1	2	2	8	11	7	21	9	9
13	2	20	5	0	5	2	11	10	10	26	10	5
14	0	18	7	0	3	0	12	16	8	24	6	4
15	0	15	5	0	5	0	15	11	6	20	8	5

	Noncommunicating Gestures		Removes Clothes	
	D	H	D	H
1	0	2	0	0
2	2	2	0	0
3	1	0	0	0
4	0	3	0	0
5	2	2	0	0
6	1	3	0	0
7	6	2	0	0
8	0	0	0	0
9	3	0	0	0

TABLE 12 - Continued

Minute	Interaction with Self Sub-Category			
	Noncommunicating Gestures		Removes Clothes	
	D	H	D	H
10	2	0	0	0
11	2	1	0	0
12	2	2	0	0
13	3	1	0	0
14	4	0	0	0
15	2	0	1	0

ular behavior, or, perhaps, that there is a common one which decreased in potency over time for the normally hearing group. Specifically, it could be proposed that physical contact with the self in this experimental situation might be prompted by either fear of the situation, or an attempt to increase or develop greater self-awareness. The former motivation, a fear of the situation, could be expected to decrease with time if one accepts the probability that as the child becomes more familiar with the experimental situation, he would become less fearful. The decreasing fear motivation could be attributed to the normally hearing group in light of the decrease in the attempting to leave which was noted for this group under the Locomotion sub-category discussion.

Based on their performance in the attempting to leave and leaving sub-categories, it could be argued that the hearing impaired group was demonstrating relatively greater fear reactions during the entire experimental videotaping sequence, thus the need for maintaining self-interaction behaviors. However, since leaving behavior did decrease for the hearing impaired and touching and looking at self did not, it might also be argued that the second motivation, the need to establish greater self-awareness, could also have been present to some degree in the sensorily impaired sample.

Vocalization and Gesturing

There seemed to be a difference in the types of vocalizations and gesturing behavior noted between the two groups of children. The normally hearing group consistently exceeded the hearing impaired group during all time segments on the following behaviors: humming, making appropriate sound effects when playing with certain toys, i.e. cars, and using articulated speech. The hearing impaired group, on the other hand, exceeded the normally hearing group in the vocalization areas of vocal play, non-identifiable speech productions, distressful sounds, and in the category of meaningful gestures. In the sub-category labelled mouthing, the hearing impaired children exceeded the normally hearing children during most time segments, but there were some time periods when this trend was reversed. Based on the vocalization data, it could be argued that the mouthings of normally hearing children were probably articulated speech attempts, whereas the hearing impaired children were likely attempting to produce vocalizations which would not generally be recognized as speech. The interesting fact concerning these findings, however, was that there were some hearing impaired children who used speech while in a "non-communicating" situation. Exploration of these children would seem to be a fruitful activity for further research. Such variables such as early amplification, preschool training efforts, and parent-child relationships might be some of the variables to be considered in such research attempts.

Summary for Interaction With Self Categories

In summary, each of the two groups of children, namely, hearing impaired and normally hearing, could be characterized in the following manner on the Interaction With Self portion of the Activity Dimension Rating Scale.

Hearing Impaired Group: As a group the hearing impaired seemed to indulge in self-exploratory activities to a greater degree than did normally hearing children. In addition, they made many more non-meaningful vocalizations including babbling types of utterances and distress sounds than did their normally hearing counterparts. The latter utterances could be interpreted as reflecting fear which would be in concert with some of the findings reported under the Locomotion and Handling discussions. Finally, the number of hearing impaired children who tended to employ gestures when placed in an isolated play situation was greater than the number of normally hearing children who also used gestures.

Normally Hearing Group: The normally hearing group was less prone to engage their persons than were the hearing impaired subjects. Most of the normally hearing children who vocalized used either articulated speech, or sound effects appropriate to the play situation they had created for themselves.

Interaction With Object Behavior

From Table 13 the following trends concerning Interaction With Objects were observed.

Gustatory Scanning

In terms of gustatory scanning or putting objects in one's mouth, the hearing impaired group tended to exceed the normally hearing group during most time intervals in this behavior. It should be noted, however, that the number of children involved in this type of activity during any particular time segment, was quite limited. Gustatory scanning could be considered reflective of an immature method for dealing with or investigating one's immediate surroundings. Thus, some hearing impaired children did resort to a more immature exploratory technique than did normally hearing

TABLE 13

SUMMARY OF EXPERIMENTAL SUBJECTS INTERACTION WITH OBJECTS
FOR EACH TEST MINUTE
(N = 142)

Minute	Interaction with Objects Sub-Category									
	Gustatory Scanning		Olfactory Scanning		General Visual Scanning		Specific Visual Scanning		General Tactual Scanning	
	D	H	D	H	D	H	D	H	D	H
1	4	3	1	1	64	37	66	68	25	22
2	5	3	0	1	59	26	65	65	19	16
3	3	3	1	1	50	25	64	65	21	12
4	6	2	0	0	44	11	65	60	16	11
5	3	1	0	0	44	21	62	66	15	11
6	4	3	1	0	46	24	62	66	13	11
7	1	0	1	1	51	18	62	53	18	13
8	2	1	0	1	45	25	53	58	18	9
9	3	1	0	0	48	18	60	60	18	7
10	6	0	1	0	48	19	65	61	16	13
11	5	0	0	0	48	17	58	58	10	4
12	2	0	1	0	39	13	48	50	12	5
13	3	0	0	0	42	11	54	49	15	5

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category									
	Gustatory Scanning		Olfactory Scanning		General Visual Scanning		Specific Visual Scanning		General Tactual Scanning	
	D	H	D	H	D	H	D	H	D	H
14	2	0	0	0	44	14	56	53	15	3
15	1	0	0	0	45	8	54	53	12	5
	Explores F - 1		Explores F - 2		Explores F - 3		Explores F - 4		Explores F - 5	
	D	H	D	H	D	H	D	H	D	H
1	27	18	9	5	16	9	22	16	3	6
2	17	15	13	3	8	7	17	12	2	0
3	15	15	4	3	7	6	13	10	1	1
4	18	15	3	3	7	5	18	11	0	0
5	21	13	10	5	8	7	21	12	2	0
6	14	6	5	4	7	2	14	7	1	0
7	18	12	8	4	5	4	20	9	2	0
8	22	10	6	6	9	4	22	8	0	0
9	26	7	7	3	9	3	19	5	3	0
10	24	8	4	2	6	2	24	5	1	0
11	24	9	3	2	6	5	21	9	0	1

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category									
	Explores F - 1		Explores F - 2		Explores F - 3		Explores F - 4		Explores F - 5	
	D	H	D	H	D	H	D	H	D	H
12	14	7	1	1	3	3	14	6	0	0
13	16	10	2	0	5	3	16	8	0	0
14	18	9	4	1	7	3	20	6	0	0
15	22	5	5	0	3	1	15	9	0	0
	Explores Specific		Inappropriate Mech. Play		Appropriate Mech. Play		Classifying J - 1		Classifying J - 2	
	D	H	D	H	D	H	D	H	D	H
1	36	43	1	2	24	25	1	1	0	2
2	37	49	4	6	25	26	1	3	0	1
3	38	39	3	9	27	30	1	3	0	5
4	34	40	1	2	28	29	0	7	1	5
5	32	43	3	7	26	28	0	3	2	4
6	32	36	2	7	18	25	0	4	0	4
7	35	39	0	5	22	24	1	2	0	1
8	25	35	2	5	18	25	2	1	1	1

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category									
	Explores Specific		Inappropriate Mech. Play		Appropriate Mech. Play		Classifying J - 1		Classifying J - 2	
	D	H	D	H	D	H	D	H	D	H
9	23	34	3	4	20	21	0	1	1	3
10	24	38	1	4	15	20	1	2	0	5
11	21	21	1	5	13	20	0	0	2	2
12	17	26	1	2	10	18	0	1	1	1
13	18	28	0	4	9	16	0	2	0	4
14	20	21	1	3	11	20	0	4	0	2
15	16	20	0	5	13	15	0	1	0	2
	Classifying J - 3		Dress-Up		Setting Up L - 1		Setting Up L - 2		Setting Up L - 3	
	D	H	D	H	D	H	D	H	D	H
1	2	2	0	4	27	30	2	2	3	4
2	2	3	0	4	21	23	2	6	2	10
3	3	4	3	4	25	28	6	9	3	8
4	2	3	1	6	19	21	4	6	5	7
5	3	4	1	3	16	24	4	6	3	8

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category									
	Classifying J - 3		Dress-Up		Setting Up L - 1		Setting Up L - 2		Setting Up L - 3	
	D	H	D	H	D	H	D	H	D	H
6	3	4	1	4	16	27	2	5	3	8
7	2	6	2	3	19	28	6	6	4	10
8	1	5	1	6	20	22	2	7	3	7
9	3	6	4	10	19	23	2	4	4	7
10	2	6	1	7	14	20	4	5	2	6
11	2	5	1	6	18	18	2	5	6	6
12	1	3	1	6	13	24	1	6	4	4
13	1	4	1	5	13	26	0	3	3	8
14	2	5	0	7	11	21	1	6	2	4
15	1	5	0	4	14	20	1	5	1	4
	Simple Pretend.		Complex Pretend.		Person Pretending		Object Pretend.		Commun. - Gesturing	
	D	H	D	H	D	H	D	H	D	H
1	15	19	2	11	1	2	0	0	1	1
2	22	26	2	13	1	4	1	1	3	1
3	29	32	3	15	0	5	1	1	4	1

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category									
	Simple Pretend.		Complex Pretend.		Person Pretending		Object Pretend.		Communi. - Gesturing	
	D	H	D	H	D	H	D	H	D	H
4	27	28	5	12	0	5	0	0	2	1
5	20	26	5	15	0	0	1	1	7	0
6	16	22	6	14	2	2	0	1	5	3
7	23	37	2	20	1	3	0	0	8	0
8	29	30	8	16	2	3	1	2	2	0
9	24	31	7	19	2	2	0	1	1	0
10	18	21	6	15	1	1	1	1	2	1
11	19	21	5	17	2	3	0	2	2	0
12	13	15	1	16	1	2	1	1	2	0
13	10	16	0	18	0	3	0	1	2	1
14	9	12	1	17	1	3	1	1	2	0
15	8	11	1	14	1	3	0	2	1	0

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category									
	Communi. - Tactual		Communi. - Speech		Communi. - Vocal Play		Communi. - Distress.		Communi. - Showing	
	D	H	D	H	D	H	D	H	D	H
1	0	0	0	3	0	0	0	0	1	0
2	0	0	0	3	0	1	0	0	1	1
3	1	0	0	4	1	1	0	0	1	0
4	1	0	0	1	3	1	0	0	1	0
5	1	0	1	6	9	1	2	0	2	1
6	2	0	1	3	6	1	1	0	2	4
7	2	1	1	4	3	1	0	0	3	0
8	2	1	2	4	6	0	1	0	1	1
9	1	0	1	1	5	0	0	0	1	0
10	2	2	0	4	1	0	0	0	0	0
11	0	0	0	2	5	0	0	0	2	0
12	0	0	0	1	4	0	1	0	1	0
13	0	0	0	3	3	0	1	0	1	0
14	0	0	0	4	4	0	1	0	1	0
15	0	0	0	2	3	0	0	0	0	0

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category											
	Communi. - Comforting		Communi. - Writing		Communi. - Drawing		Problem Solving 1		Problem Solving 2		Problem Solving 3	
	D	H	D	H	D	H	D	H	D	H	D	H
1	0	0	2	0	1	4	4	5	3	9	5	6
2	0	0	0	1	1	7	5	7	5	17	2	6
3	1	0	0	0	2	4	2	6	4	8	5	5
4	0	0	0	0	2	3	2	7	4	8	3	8
5	0	0	1	0	4	5	5	6	11	12	5	7
6	0	0	1	2	2	6	5	6	15	17	4	5
7	0	0	0	2	1	5	2	5	7	16	8	9
8	0	0	1	0	2	7	3	8	5	11	6	10
9	0	0	1	0	2	3	7	6	6	11	4	7
10	0	0	1	0	3	3	7	9	6	14	3	9
11	0	0	0	0	2	5	1	7	8	16	5	10
12	0	0	0	0	0	4	0	8	2	10	3	5
13	0	0	0	0	0	5	0	6	1	11	5	6
14	0	0	0	0	0	4	0	7	2	16	4	8
15	0	0	0	0	0	3	0	7	1	13	6	12

TABLE 13 - Continued

Minute	Interaction with Objects Sub-Category			
	Problem Solving 4		Problem Solving 5	
	D	H	D	H
1	6	7	0	5
2	9	14	5	6
3	4	9	6	7
4	6	9	4	9
5	4	7	5	6
6	7	13	6	7
7	8	9	9	9
8	6	8	9	14
9	4	11	5	7
10	6	6	1	5
11	4	8	3	5
12	5	6	2	8
13	3	9	3	4
14	5	6	2	4
15	5	8	1	6

children.

Visual Scanning

Differences appeared between the two groups of children in the types of *visual scanning* behaviors identified. The normally hearing group tended to engage in *specific visual scanning* activities, i.e. looking directly at specific toys or sets of toys, whereas the hearing impaired children divided their visual attending performance between focusing visually on specific objects and ambient or *general visual scanning* of the room with no apparent purpose for the child's visual attending behavior. Such behavior as *general visual scanning* has been identified by Myklebust (Myklebust, 1960) as an integral part of a hearing impaired child's attempt to monitor happenings in his immediate surroundings. In this situation, however, it was not possible to state unequivocally whether the behavior was routine or whether the *visual scanning* resulted from the child's constant movement about the room. In other words, which behavior precipitated which is still an unresolved question. In spite of this, there was no reduction in the amount of ambient scanning over time with the hearing impaired children always exceeding the normally hearing in this behavior.

Tactual Scanning

Tactual exploration of a specific nature was more commonly found in the hearing impaired group. The general or ambient tactual behavior of superficially touching or *fingering objects* seemed to be commonly found in both groups of children, with little reduction in occurrence over time, but the specific acts of *opening doors*, *moving objects slightly* with no intent to engage them, looking into compartments, and closing doors were more commonly found in hearing impaired children. Interestingly, the number of hearing impaired children involved in such activities did not seem to decrease appreciably over time, whereas the amount of specific tactual exploration by normally hearing children did decrease to negligible levels as time progressed. Such types of activities would be expected during the initial time segments since they reflect exploratory behaviors, but prolonged execution of these tasks can only be interpreted as superficial interaction with the play equipment. In other words, the hearing impaired children frequently did not interact with the play equipment provided beyond a mere exploratory level. For example, children were noted to open and close doors very rapidly usually within the same minute segment, a behavior which was not characteristic of normally hearing children. The normally hearing children had cupboard compartments, cabinets, and/or drawers open longer and closed them fewer numbers of times during the experimental session. Thus, the normally hearing group might be considered less neat, but certainly less interested in the tactual manipulation of the equipment doors and more interested, apparently, in the inner recesses of the play equipment than the hearing impaired children.

Tactual scanning of a very specific nature, i.e. examining individual parts of a toy presumably to learn more about the toy's operation, was consistently more prevalent among the normally hearing group during all time periods. The disparity between the number of hearing impaired and normally hearing children who performed this act became greater over time with the normally hearing sample consistently higher. This would seem to indicate a lessening of interest in exploring particular toys on the part of the hearing impaired children. This decrease in specific tactual scanning coupled with the continuously high amount of general or ambient tactual exploration on the part of the hearing impaired group is consistent with the behavior of these hearing impaired children in the visual modality.

Play Behavior

In the amount of behavior noted in all areas of actual play behavior, namely, mechanical, classification, dressing up, setting up, pretending, and problem solving, the normally hearing children exceeded the hearing impaired. Among the normally hearing group, the number of children involving themselves in the highly creative aspects of play such as appeared under the sub-categories of pretending and problem solving was limited in comparison to other play sub-categories, but the number of hearing impaired children involved in these same tasks was even less. These findings would support a conclusion that more normally hearing children actually played in the experimental situation than did hearing impaired children. However, the numbers of normally hearing children involved in highly complicated play activities was not as great as might have been anticipated given the highly inviting nature of the play environment. A probable limiting variable was time, that is, there was not enough time for most of the children to become overly involved in "playing".

Communication

The hearing impaired children, as a group, when attempting to communicate with dolls or imaginary "Harvey" type characters, would use the symbolic systems of gesturing, or the non-symbolic vocalizations of distressful sounds. In other words, the hearing impaired children would either attempt to engage his "communication partner" by gesturing to him, or by appealing to him with distressful sounds such as crying, whimpering, etc. The normally hearing children, on the other hand, used the avenue of articulated speech itself. The normally hearing children far exceeded the hearing impaired children in attempts at the symbolic acts of printing and/or drawing on the blackboard.

Summary of Interaction With Objects Categories

In conclusion, the normally hearing and hearing impaired groups can be described in the following manner with reference to the category of Interaction With Objects.

Hearing Impaired Group: The hearing impaired children tended to explore the environment in a superficial manner, employing taction, vision, and even gustation primarily as scanning or exploratory modalities. As a group, they tended not to interact with play equipment beyond the general exploratory level.

Normally Hearing Group: The normally hearing group was frequently specific in their exploratory attempts in the experimental play setting. That is, the normally hearing group explored specific toys, rather than the entire environmental setting. Play activities of all sorts were more commonly found among normally hearing children than among hearing impaired children. However, the more simplified forms of play behavior predominated over the more complicated and involved forms for this group. Relative to symbolic activity, more attempts at drawing and/or printing were found among the normally hearing children at all time intervals than among the hearing impaired subjects.

Object Dimension

Because of the limited number of data points per cell in this particular portion of the analysis, it was decided to treat the data as an entity by disregarding individual toy categories. The statistical comparison, therefore, was made of the normally hearing group and the hearing impaired group's total Object Dimension Scoring Procedure data over time, to determine any differences in the number of objects engaged by either group. Initial analysis of the data revealed that the contribution of the sub-categories listed under heading I, which was an enumeration of the elements of the environmental setting itself, i.e. walls, windows, etc., was so small as to be almost meaningless. Therefore, it was decided to eliminate these data from further consideration. All remaining statistical and descriptive treatment of the Object Dimension Scoring Procedure data involved only that portion of the scale enumerating moveable objects. As with the Activity Dimension Scoring Procedure data, it was decided that time would be organized into five minute segments, namely, one to five minutes, six to ten minutes, and eleven to fifteen minutes.

Statistical Analysis of the Object Dimension Rating Data

Appendix I presents the means and standard deviations of the number of moveable objects engaged for each subject for each of the three time intervals. These data were subjected to an analysis of variance using hearing status and time as the independent variables. The results of this analysis are presented in Table 14. As in-

TABLE 14

RESULTS OF AN ANALYSIS OF VARIANCE ON THE OBJECT DIMENSION DATA OVER THE THREE TIME INTERVALS FOR THE HEARING IMPAIRED AND NORMALLY HEARING GROUPS

Variable	Sum of Squares	Df	Mean Squares	F
Hearing (H)	.0003488	1	.0003488	0.12
Time (T)	.5292175	2	.2646087	96.28*
H x T	.0079585	2	.0039792	1.44
S (HT)	1.1541843	420	.0027480	

*At .01, F = 4.21

dicated, there was a significant difference at the .01 level of confidence on the time variable, which indicates that the number of objects engaged by the two groups decreased significantly over time. No statistical difference appeared on the hearing status or interaction variables. This would seem to indicate that the number of objects actually engaged by the two sets of children was not contingent on hearing status.

Descriptive Analysis of the Object Dimension Data

To gain a clearer picture of the specific items engaged over time, a compilation was performed for the Object Dimension Scoring Procedure data as had been accomplished for the Activity Dimension Scoring Procedure data. Specifically, the number of children, separated by hearing status, engaging a particular toy during each minute segment was tallied. This enumeration is presented in Table 15. The listing proceeds in the same order as the categories appear on the Object Dimension Rating Scale. As can be seen, the

TABLE 15

SUMMARY OF EXPERIMENTAL SUBJECTS OBJECT ENCOUNTERS FOR EACH TEST MINUTE

(N = 142)

Minute	Object Sub-Category													
	Scales		Bed - Matress		Doll Clothes		Black Doll		White Doll		Raggedy Ann		Raggedy Andy	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
1	0	0	12	15	4	3	2	5	4	5	3	3	3	3
2	1	4	16	15	12	14	10	15	10	15	8	11	6	13
3	5	6	24	27	14	13	12	13	11	13	14	13	11	10
4	8	12	26	25	18	16	14	12	16	14	12	16	10	15
5	13	16	28	28	17	21	16	19	14	20	15	13	14	10
6	10	17	27	36	12	34	16	28	15	27	10	19	11	17
7	11	21	24	35	14	35	18	32	18	34	8	18	10	15
8	9	27	21	37	12	31	15	33	17	36	12	21	11	20
9	10	25	19	34	13	29	17	29	14	33	10	24	7	24
10	9	22	15	35	7	32	14	31	11	30	8	25	10	21
11	11	19	12	30	9	28	9	27	10	26	5	24	5	22
12	7	12	9	26	4	21	9	23	9	19	3	19	3	15
13	6	14	5	25	1	20	4	22	5	21	3	17	2	11

TABLE 15 - Continued

Minute	Object Sub-Category													
	Scales		Bed-Matress		Doll Clothes		Black Doll		White Doll		Raggedy Ann		Raggedy Andy	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
14	4	15	3	22	1	18	2	20	2	19	1	15	0	13
15	2	11	4	19	0	10	2	16	1	17	2	13	0	13
	Sasha		Gregor		Ironing Board Set		Chalk Board		Dutch Cabinet		Pots		Dishes	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
1	11	13	9	12	6	15	0	0	38	37	0	1	0	0
2	16	15	12	12	9	25	0	2	42	49	11	10	5	9
3	22	26	20	25	12	27	1	5	44	47	16	18	14	13
4	24	22	22	22	14	26	4	10	54	49	23	28	19	14
5	21	25	19	20	13	29	3	9	50	56	27	26	22	21
6	24	35	19	27	11	32	1	12	51	53	28	29	24	19
7	24	30	21	29	14	30	0	10	49	56	26	30	24	22
8	20	33	17	30	12	29	0	9	52	54	27	26	27	29
9	17	29	15	31	15	26	1	10	47	49	23	21	25	28
10	15	31	12	30	10	27	0	7	48	45	19	20	21	20

TABLE 15 - Continued

Minute	Object Sub-Category													
	Sasha		Gregor		Ironing Board Set		Chalk Board		Dutch Cabinet		Pots		Dishes	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
11	10	25	9	21	8	21	1	6	42	46	15	16	18	21
12	6	21	6	19	5	19	0	4	39	45	12	10	11	16
13	5	17	2	17	6	15	0	0	36	42	8	8	6	11
14	3	15	1	12	3	16	0	1	34	43	4	9	2	7
15	3	12	0	11	1	12	0	1	35	39	3	6	2	5

	Refri.		Hats		Stove		Broom Set		Carpet Sweeper		Sink		Eating Utensils	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
1	36	35	0	0	33	36	4	6	2	7	35	36	0	0
2	41	50	0	0	41	47	9	8	7	11	40	38	1	7
3	45	42	0	2	44	43	11	15	6	14	43	42	10	9
4	50	50	1	2	49	42	10	18	7	12	53	51	12	13
5	47	57	3	6	47	52	9	20	5	18	47	55	16	18
6	45	51	4	5	47	49	14	18	11	15	49	53	15	20
7	51	53	3	8	46	51	10	12	10	11	46	50	19	18
8	50	54	5	4	49	49	11	16	9	17	50	48	22	25

TABLE 15 - Continued

Minute	Object Sub-Category													
	Refrig.		Hats		Stove		Broom Set		Carpet Sweeper		Sink		Eating Utensils	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
9	52	52	3	6	44	51	9	12	9	11	48	51	21	26
10	50	54	2	5	46	49	10	17	6	16	47	49	17	19
11	47	50	1	1	45	44	9	15	7	13	44	42	14	13
12	44	49	0	2	41	45	7	10	7	9	49	40	6	14
13	38	47	0	0	37	39	4	8	1	8	41	42	6	11
14	35	40	1	0	33	41	2	9	0	5	36	39	2	5
15	31	35	0	0	38	32	0	1	0	1	32	37	0	0
	Wooden Blocks		Foam Blocks		Table Set		Toaster		Volks-wagon		Dump Truck		Wrecker	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
1	0	1	0	4	64	62	16	21	9	12	1	13	2	12
2	0	0	2	11	68	61	21	20	8	14	3	21	3	15
3	1	2	3	9	65	59	18	21	11	10	5	26	1	17
4	0	2	1	12	63	60	16	18	9	11	4	22	2	16
5	1	3	2	10	60	54	13	10	8	14	4	23	1	19
6	0	1	0	9	61	48	10	7	11	17	5	20	3	21

TABLE 15 - Continued

Minute	Object Sub-Category													
	Wooden Blocks		Foam Blocks		Table Set		Toaster		Volkswagon		Dump Truck		Wrecker	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
7	1	2	1	11	63	44	11	8	10	20	3	16	2	25
8	2	2	2	13	60	45	11	6	12	18	2	18	0	21
9	0	1	2	9	61	41	10	4	8	19	1	21	0	19
10	0	1	1	9	59	40	6	1	10	17	2	19	0	24
11	0	0	0	10	56	42	6	1	9	15	1	20	0	21
12	0	0	1	9	60	39	5	1	7	10	0	15	0	25
13	0	1	1	5	61	40	4	1	5	11	1	11	0	23
14	0	0	0	3	63	37	4	0	3	9	0	8	0	19
15	0	0	0	0	60	39	2	0	0	7	0	10	0	15
	Bull-dozer		Crane		Puzzle Box		Puzzles		Stuffed Animals		Drum		Fire Engine	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
1	6	12	2	11	0	0	0	0	0	0	0	3	1	15
2	7	11	1	16	0	0	0	1	1	0	1	4	4	20
3	8	10	2	18	0	1	0	1	0	0	2	6	5	26
4	10	9	4	16	0	1	0	2	0	0	4	8	3	30

TABLE 15 - Continued

Minute	Object Sub-Category													
	Bull-dozer		Crane		Puzzle Box		Puzzles		Stuffed Animals		Drum		Fire Engine	
	D	H	D	H	D	H	D	H	D	H	D	H	D	H
5	7	16	1	17	0	2	0	2	1	0	3	7	5	27
6	9	15	3	19	1	1	0	1	0	0	4	9	6	21
7	9	16	3	21	1	1	0	1	0	0	2	10	5	22
8	11	14	1	18	1	2	0	1	1	0	3	13	7	24
9	8	17	0	21	0	1	0	0	0	0	5	11	6	20
10	7	17	1	15	0	0	0	0	0	0	5	9	7	19
11	3	15	2	13	0	0	0	0	0	0	6	7	5	22
12	5	11	0	10	0	0	0	1	1	0	3	4	8	18
13	2	13	1	9	0	1	0	1	0	0	5	2	4	21
14	1	10	0	7	0	1	0	0	0	0	2	6	3	19
15	1	11	0	5	0	1	0	0	0	0	3	1	5	18
	Airpl. Prop.		Airpl. No Prop.		Pull Bee		Pull Train		Heliocop.					
	D	H	D	H	D	H	D	H	D	H				
1	13	16	13	15	5	10	5	10	13	17				
2	16	18	10	14	10	7	9	8	16	20				

TABLE 15 - Continued

Minute	Object Sub-Category									
	Airpl. Prop.		Airpl. No Prop.		Pull Bee		Pull Train		Heliocop.	
	D	H	D	H	D	H	D	H	D	H
3	18	15	9	11	9	5	9	3	19	17
4	21	12	10	7	6	3	5	0	24	15
5	20	10	9	5	5	0	1	0	26	13
6	17	7	6	1	3	0	0	0	24	11
7	18	5	5	0	0	0	1	0	27	11
8	16	8	7	1	1	0	0	0	25	9
9	17	9	6	0	0	0	0	0	19	10
10	14	11	3	1	0	0	1	0	24	9
11	19	10	3	0	1	0	1	0	17	7
12	16	7	1	0	0	0	0	0	21	8
13	17	8	0	1	0	0	0	0	20	10
14	12	6	0	0	0	0	0	0	16	7
15	9	5	1	0	1	0	1	0	12	6

toys most engaged by both sets of children was essentially the same, namely, the kitchen equipment. There were differences in the number of children, who engaged some of the toy cars. This trend might have been expected in light of the fact that most of these play items were found closer to the ground, a location preferred mostly by normally hearing children. (see Locomotion, p. 60)

Experimental Questions

A videotape study of seventy-one pairs of hearing impaired and normally hearing children was conducted to compare the play behavior of these two groups of children. The observational data were subjected to both statistical and descriptive analyses, to answer the experimental questions postulated in Chapter I.

1. a. When placed in an individual play situation, were hearing impaired children more active than normally hearing children?

The data indicated that the hearing impaired group was statistically more active than the normally hearing group on the dimensions of Locomotion, Handling, and Interaction with Self. There did not seem to be a difference between the two groups on Interaction with Objects. In other words, the hearing impaired children moved about the room, handled objects, and interacted with themselves more often than did the normally hearing group, but both groups performed on objects at about the same rate.

b. When placed in an individual play situation, was there any change in the amount of activity observed for the normally hearing or hearing impaired children over time?

Statistical analysis of the activity dimension data revealed that there was a decrease over time in three of the four categories listed under the Activity Dimension. There was a dramatic reduction in performance between the second five minute interval to the last five minute interval in the categories of Locomotion, Handling, and Interaction with Self. The sole exception was Interaction with Objects where performance levels tended to be comparable from one five minute segment to the next. This decrease in activity level was noted for both the hearing impaired and normally hearing groups.

2. a. When placed in an individual play situation, did hearing impaired children undertake different types of activities than normally hearing children?

The descriptive data compiled on the performance of these two groups of children do indicate significant differences in the number of hearing impaired children and the number of normally hearing children who performed certain specific tasks. The major differences noted between the two groups will be discussed according to the activity category in which they appeared.

Locomotion

The hearing impaired group had more children during each minute segment who performed non-intentional movements than did the normally hearing group. The normally hearing group, on the other hand, had more intentionally moving children than did the hearing impaired group at each time interval. In addition, those activities which tended to bring children into closer proximity to all play equipment in the experimental play area, i.e. stooping and sitting, were more characteristic of normally hearing children than of hearing impaired children. Finally, those activities most easily performed on a flat surface such as a floor were more likely to occur among normally hearing children than among hearing impaired children.

Handling

There was no significant difference in the pick up rate between the normally hearing and hearing impaired groups. However, it was noted that hearing impaired children were more prone to move with the object after picking it up and/or to replace the object in its initial position, all within the same time segment, than were normally hearing children.

Interaction with Self

The hearing impaired children exhibited actions involving themselves and/or their clothes more often than normally hearing children. Types of vocalizations produced were also a discriminating factor between these two groups of children, with normally hearing children using more speech and sound-effect utterances, while the hearing impaired children employed more babbling-like noises and distress sounds like crying. In addition, the hearing impaired group displayed much more gesture behavior than did the normally hearing group.

Interaction with Objects

Generalized, and somewhat primitive, methods of exploration were employed by the hearing impaired group. The use of gustation, ambient vision, and ambient taction played a predominate role in the general exploration behavior exhibited by the hearing impaired children in this experimental situation. In contrast to this behavior, the normally hearing group tended to be more selective in their exploratory efforts using primarily focal point vision and specific, intentional, taction as the main exploratory avenues.

A most significant difference was the frequency of appearance of the number of children who demonstrated actual play behavior, either mechanical or creative in nature. All play behavior sub-categories occurred with greater frequency among the normally hearing children than among the hearing impaired children. Of particular significance was the rapid emergence of complex pretending play behavior in the normally hearing group. Almost 25% of all normally hearing children began to indulge in complex pretending behavior during the first few minutes of the introduction into the test situation. In contrast, only 8% of the hearing impaired children succeeded in attaining this level of performance, and if complex pretending behavior did appear, it would usually emerge late in the session.

b. When placed in an individual play situation, was there any change in the type of activity observed for the normally hearing or hearing impaired children over time?

Analysis of the Activity Dimension data revealed that there were no significant changes in the type of activities pursued by either group of children over time. In other words, whichever group, normally hearing or hearing impaired, had attained the highest performance level in a particular activity sub-category during the first few minutes of the session, usually maintained their superiority at the conclusion of the experimental session. However, because of the decrease in overall activity level with time, the number of children performing this act might have decreased for both groups from the first to the fifteenth minute segment.

3. When placed in an individual play situation, were there differences among the hearing impaired children and among the normally hearing children when each was compared to their group's performance?

A discriminate analysis performed on the individual activity dimension data, which constituted a full compliment of 142 children, revealed that as a group the hearing impaired tended to be more homogenous than the normally hearing group. Examination of the individual profiles of those normally hearing children, who constituted the deviant group, revealed no observable, consistent differences which could account for their divergency from the remainder of the group. In contrast, however, the two hearing impaired groups, normative and deviant, seemed to separate themselves into a male/female dichotomy with the more deviant hearing impaired behavior being demonstrated by the predominately female sub-group. No other dimension seemed to have a significant bearing on the division noted within the hearing impaired group. The implications and significance of the individual sortings of the two experimental groups need to be investigated further to gain a clearer picture of individual differences that might effect children's behavior under a test situation as outlined in this study.

4. a. When placed in an individual play situation, did hearing impaired children engage more toys than normally hearing children?

The results of an analysis of variance comparing the number of toy encounters noted for normally hearing and hearing impaired children did not yield significant results. This finding would seem to indicate that the number of toy encounters was essentially the same for both groups of children.

b. When placed in an individual play situation, was there any change in the number of toy encounters by normally hearing and hearing impaired children over time?

The results of an analysis of variance comparing the number of toy encounters produced by both groups of children during the three time periods established for this study, yielded a highly significant result with regard to the relation of a time factor to the number of toy encounters. Over time, the number of objects engaged by both groups of children decreased significantly. These results would seem to be consistent with the results obtained from a comparable analysis of the Activity Dimension data.

5. When placed in an individual play situation, was there any difference in the type of toys engaged by the normally hearing or hearing impaired children over time?

Time did not seem to be a factor in determining the number of children from each group who would have encounters with specific toy categories. However, there was one significant difference between the two groups of children in the type of toys they engaged irrespective of the time variable. That difference was one of placement; that is, the number of normally hearing children engaging toys placed closer to the floor, i.e. the toy cars, was consistently greater than the number of hearing impaired children interacting with these same objects. This finding was in agreement with previous findings concerning the types of activities performed by these two groups, namely, the normally hearing children tended to perform actions which placed them closer to the floor of the experimental setting. It would seem only logical, then, that such activity would be coupled with encounters of toys situated closer to this playing area.

In summary, the results of this investigation would seem to indicate two consistent findings:

1. That time was a factor in that the amount of activity noted by the raters significantly decreased as the play session progressed, and

2. That quantitative and qualitative patterns of play behavior was noted between the two groups of children which would suggest probable differences in their capabilities of dealing with the current experimental play situation.

CHAPTER IV

DISCUSSION

This chapter consists of a discussion of the limitations of the current research, the significance of the results obtained, and their implications for current practices within educational settings for hearing impaired children. An additional section with suggestions for future research is also included as a guide to other investigators in the area of play behavior of young handicapped children.

Specific Limitations of the Current Research

The limitations of this study can be seen in four areas, namely, the amount of time provided for each child while in the individual play situation: the contrived nature of the experimental play area; the choice of sample; and the chronological ages of the children studied.

Time

The number of children in either the hearing impaired or normally hearing groups who managed to progress to the more sophisticated levels of complex play was comparatively small when one considers the total size of the sample evaluated. This lack of appearance of complex play behaviors would seem to suggest at least two possible factors within the current design which could have acted as deterring agents. Either the test environment was not conducive to the appearance of complex play activities, or the amount of time allotted for the individual play session was not sufficient to permit the expression of such behavior in most children. The finding that some children, particularly within the normally hearing sample, did attain the complex play level, would tend to negate the possibility that the environment was not conducive to the expression of play. Instead, it seems more reasonable to assume that time was a more influential factor in eliciting play. It could be argued that for some children, particularly among the hearing impaired, it may take more than fifteen minutes for them to accustom themselves sufficiently to engage in behavior beyond the exploratory stage.

Experimental Environment

In spite of all efforts to normalize the play room-television studio, the test area did have artificial qualities about it. For all children, the situation was a new one, which may have served as an inhibiting force to some behaviors, or may have served as an accentuating factor for other behaviors. That is, exploratory behavior may have been accentuated to the detriment of complex or actual play behavior. In addition, the situation involved separating the child from his parent, placing him in a strange environment, and, then, urging him to play, which at that point in time, might not have been his desire. Such an approach may have been responsible for some of the differences observed between the two groups of children.

However, the situation was constant across all subjects, and the data generated are still to be considered valuable. The data certainly reflect how each group of children was able to cope with a novel play environment. Thus, the data obtained could be seen as commenting primarily on the ability and styles with which hearing impaired and normally hearing children cope with new situations where a wealth of play material was made available to them. Such information should be useful for teachers and school administrators, for it provides insight into how children react to changes in their schedules or localities, and how they might react to changes in lessons, which necessitate introduction of new materials.

The question still remains as to how hearing impaired and normally hearing children react in unstructured play situations, namely, those most familiar to them such as found at school or at home. In addition, one could question what might be the effect, in this particular play environment, of repeated visitations to the play area.

Sample Choice

Although the experimental samples were extensive, they were limited in geographic distribution to the Cincinnati area. It can not be said unequivocally that the experimental children, normally hearing and hearing impaired, reflect the developmental rates and abilities level of children from other geographic areas. In addition, the hearing impaired subjects, although comprising a suitably large sample which was operationally defined as being significantly hearing impaired, were quite diverse in that exposure to amplification varied greatly, preschool experiences varied considerably among the children, and exposure to systematic instruction within the home also varied greatly. Such variables could have had an effect on the results of this study. Control of these factors was not always possible and even of the subjects that were selected, division into various sub-groups would have made the groups so small as to make statistical comparisons impossible.

Chronological Age

Toy selection was not a significant factor in this study, which was an unexpected finding. It is possible that a built-in bias was introduced by restricting the chronological age distribution. If the chronological age boundaries had been extended upward as far as eight and downward to two years, differences in toy selection might have appeared.

Significance of the Results

Keeping the limitations in mind, the strong impression which emerges from the study is still the obvious difference in the degree and types of activities performed by the two groups of children. Specifically, the hearing impaired group can best be characterized as: 1) more active than the normally hearing group while in the test situation; 2) less goal directed in that they performed tasks identified as "general" scanning or non-intentional movement more frequently than did the normally hearing sample; 3) employing more immature exploratory techniques; and 4) demonstrating less actual play behavior than the normally hearing subjects.

There are three factors that can be hypothesized which could account for the results obtained. It should be recognized that these factors are not mutually exclusive and may be interrelated phonemonon. The interpretation of results could have been influenced most by: a) hearing impairment itself; b) fear and anxiety; and c) learning or lack of learning opportunities.

Hearing Impairment

The overemphasis on visual and tactual "general" scanning behavior found among the experimental hearing impaired sample, as well as the appearance of more gustatory behavior, would be in general agreement with the impressions and hypotheses of Myklebust. (1960) It is his contention that hearing impaired children accomplish exploration through extensive use of vision and taction. Such behavior would be expected as a result of a compensatory shift in hearing impaired children from audition as a primary information sense to vision. Myklebust hypothesizes that normally hearing children, by virtue of their intact auditory sense, can use audition for purposes of general scanning and development of homeostatic relationships with the immediate environment. As a result, vision plays a secondary, focusing role, which is called into use when the child auditorially recognizes some discordant note within his environment. Hearing impaired children, on the other hand, shift in a compensatory manner so that vision is used for general scanning and either taction or gustation become specific scanning mechanisms. Such an organismic shift should result in more visual, tactual, and gustatory behavior particularly when the environment is conducive to exploration.

Therefore, many of the behaviors noted in this particular play situation were consistent with the proposed effects of hearing impairment as postulated by Myklebust. However, since play behavior as a symbolic function must be learned, its absence can not be entirely attributed to the compensatory effects of hearing impairment. Nevertheless, presence of hearing impairment does seem to act as a filter which may encourage certain basic exploratory and scanning behaviors to appear or not to appear depending on the environment.

Fear

The hearing impaired subjects performed acts, i.e. leaving the room, excessive crying, which were suggestive of fear of the situation; acts which were not characteristic of the normally hearing children. The novelty of the situation might account in part for some of this fear reaction, but by comparison, normally hearing children did not exhibit the same degree of fear. How is this difference in amount of fear reaction to be explained? Indeed, it should be noted that the presence of fear reactions may have accounted for some of the behavior differences which appeared in the test situation, i.e. the apparent lack of goal directed behavior of the hearing impaired group, and perhaps to a certain degree, the lack of appearance of actual play behavior among this group of children.

Two interesting informal observations were made during the videotaping sessions, which might have a bearing on differences in fear reactions between the two groups of children:

1) In many cases, it was observed by a member of the research team, or it was reported to the research staff upon inquiry, that the mothers of the normally hearing children had carefully explained verbally to their child what was to happen, namely, that he was to be placed alone in a room with toys where he could play while mother was having a conversation with someone elsewhere in the building. Such interaction did not occur between parents and their hearing impaired children, primarily because of the limited language abilities of most of the children included in this study. In fact, two children of deaf parents were included in this study: children who had access to manual communication systems, namely, fingerspelling

and formal signs. Yet, both of these children could have been communicated to by their parents to reduce their feelings of insecurity. Such was apparently not the case since in both instances comparable fear reactions were observed. One hearing impaired mother was asked if she had explained to her son the nature of the experiment. She replied she had not. One can not help but wonder what would have happened had she done so.

2) Immediately after the test was completed, the reaction of the parents of the hearing impaired children was one of intense anxiety, which was reflected in the manner they fawned over their children. Most of these parents picked the children up and said things like "That's O.K. It's all over." Such behavior can only be considered as being prompted by anxiety, and such feelings in the parents could previously have been sensed by the child, thus, producing fear reactions.

Anxiety as a factor in parents of hearing impaired children was further demonstrated by the differences of parents while observing the videotape session. All parents were given the option of viewing the test session, if they so desired. Every parent, who had accompanied his child, desired to watch. While viewing the taping, the anxiety level of the parents of hearing impaired children was noted to be much greater than that of the parents of the normally hearing subjects. The hearing impaired children's parents frequently asked if their child was all right and whether he would be scarred emotionally by the experience, whereas the questions of the parents of normally hearing subjects concerned themselves with whether the child was "normal" or not in his behavior. An interesting sidelight was the fact that the mothers of the hearing impaired children seemed to pace more about the room, refused to sit in a chair, and smoked a great deal more than mothers of the normally hearing children. It is clear that there was a difference in the anxiety level between the two sets of parents, and this difference could in part explain the differences in fear reactions between the two groups of subjects.

Learning or Lack of Learning

Not all hearing impaired children were fearful of the test situation. And yet, even among these children, comparable types of behaviors were noted, namely, less goal directed behavior and the absence of many play sub-categories particularly in the pretending area. Certain observations were made which might tend to support the impression that hearing impaired subjects did not know how to play. In reviewing the videotapes, both raters comment upon the "wandering" behavior of the hearing impaired subjects. It was suggested that they exhibited behaviors which made them appear to be lost in the situation.

Some antidotal evidence in the literature (Kharasch, 1965; McDermott, 1970) suggests that hearing impaired children have to be taught to play. Since play is a symbolic process and since hearing impairment has an effect on one symbolic process, namely, language, it is reasonable to expect a lack of development in another symbolic area, namely, play. It is possible that the behavior of the hearing impaired subjects in this project could be due to a lack of learning the basic schemas which allow for complete expression of the symbolic processes related to play.

Future Research Needs

This research is a preliminary attempt to specify some of the parameters related to spontaneous play behavior in both normally hearing and hearing impaired preschool children. There is need for continued research into this area. Consideration should be given by future researchers to the following modifications and suggestions:

1) Fifteen minutes may not be a realistic observation time. Thus, extending observational time to larger time units should be considered, perhaps to thirty minutes.

2) Repeated visitations to a given play situation should be considered to see if any changes in behavior occur as a function of familiarity.

3) Attempts should be made to extend this technique of observation to other play situations more familiar to the child, i.e. those found in the school and at home.

4) Stricter control of variables such as degree of hearing loss, amplification exposure, preschool exposure with regard to both degree and type, and exposure to different communication systems, should be investigated to see if differences among sub-groups of hearing impaired children appear.

5) Children from different geographic areas within the country should be studied to see if the present findings are generally applicable.

6) Chronological age could either be expanded or groups of younger and older children could studied to determine any differences that might appear as a function of age.

7) Effects of parent communication and family anxiety levels on play behavior, particularly, in new play situations, should be explored and controlled for when studying children's play.

Implications

Certain tentative implications for classroom management of hearing impaired, preschool children can be drawn from the experimental results. First, since fear was such an obvious reaction in the hearing impaired sample, more concern should be given by teachers to alleviate this condition within the classroom and/or home situation. It is possible that either a) parent anxiety levels are so high that they produce a state of constant anxiety in their hearing impaired child, or b) the hearing impaired child's tolerance to change may be quite low. In either case, definite steps should be taken, namely, through intensive parent counselling programs, or well thought out programs to explore the possible effects of change when change is being contemplated in a hearing impaired child's life. A child who lives in a perpetual state of fear is certainly not one who will be able to profit adequately from the activities provided for him.

Second, since the experimental situation, which was a novel one, prompted tremendous amount of general exploratory and scanning activity in this sample of hearing impaired children, it might behoove educators of the hearing impaired to realize that exploratory behavior might be a logical outcome when initiating new situations and/or presenting new materials to their children. That such insight on educators' parts is not always present has been verified by this investigator's visitations to classrooms for preschool, hearing impaired children. He has witnessed children's outbursts and subsequent reprimands from teachers because of exploratory reactions to new situations. The teachers are usually concerned about the children not being "attentive." Perhaps, these teachers should become more cognizant of a need for exploration by hearing impaired children, and provide opportunities which will allow for controlled exploration without the detraction of anger or hostility.

Third, although the evidence provided in this study is not indisputable, there is sufficient suggestion that educators of preschool, hearing impaired children need to think about the possibility of including training in areas of symbolic activity such as play and/or drawing in their curricula. Emphasis has traditionally been placed on the area of language development, often without concomitant growth in other symbolic areas. Symbolic processing is important, particularly if one accepts Piaget's and Vygotskii's contentions, that hearing impaired children must master play activity, for the knowledge gained from this exercise aids in the full development of other symbolic dimensions, specifically, language. Curricular development in the area of preschool education for the hearing impaired should certainly, then, consider play as an important instructional area.

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APPENDIX A

INDIVIDUAL PROFILES ON EACH OF THE 142 CHILDREN USED IN THE PROJECT

APPENDIX A

Pair 1

Case: 1
Age: 4-6
Sex: F
Religion: Catholic
Socio-economic Status: 2
Family Position: 3rd of 3
IQ: 124
Race: Caucasian
Family Situation: PLT*

Hearing Status:

	Rt. ear	Lt. ear
250	85	70
500	100	90
1k	100	95
2k	85	90
4k	85	85
8k	NR	95

Amplification Initiated: 2-4

*PLT means Parents Living Together.

Case: 72
Age: 4-5
Sex: F
Religion: Catholic
Socio-economic Status: 2
Family Status: 3rd of 3
IQ: 116
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 2

Case: 2
Age: 5-2
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: 2nd of 3
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	35	75
500	45	105
1k	50	NR
2k	50	NR
4k	60	NR
8k	80	NR

Amplification Initiated: 4-7

Case: 73
Age: 5-6
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: 2nd of 3
IQ: 112
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 3

Case: 3
Age: 4-4
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 101
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	75	65
500	75	70
1k	70	55
2k	60	55
4k	60	55
8k	60	60

Amplification Initiated: 3-10

Case: 74
Age: 4-4
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2*
IQ: 102
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*An older sibling was no longer living in the home.

Pair 4

Case: 4
Age: 4-0
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: 2nd of 2
IQ: 107
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	60	NR
500	80	95
1k	80	100
2k	75	110
4k	70	NR
8k	85	NR

*Amplification Initiated: 2-1

Case: 75
Age: 3-11
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: 2nd of 2
IQ: 99
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 5

Case: 5
Age: 4-5
Sex: M
Religion: Catholic
Socio-economic Status: 4
Family Position: 3rd of 5
IQ: 104
Race: Caucasian
Family Situation: PLNT**

Hearing Status:

	Rt. ear	Lt. ear
250	55	85
500	85	90
1k	90	85
2k	75	75
4k	80	75
8k	85	75

Amplification Initiated: 2-9

Case: 76
Age: 4-4
Sex: M
Religion: Catholic
Socio-economic Status: 4
Family Position: 3rd of 5*
IQ: 93
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

*There was a set of twins, which was counted as five births.
** PNLT means Parents Not Living Together.

Pair 6

Case: 6
Age: 4-5
Sex: F
Religion: Protestant
Socio-economic Status: 4
Family Position: 1st of 2
IQ: 101
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	85	90
500	105	105
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-4

Case: 77
Age: 4-8
Sex: F
Religion: Protestant
Socio-economic Status: 4
Family Position: 1st of 2
IQ: 108
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 7

Case: 7
Age: 4-3
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 115
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	110	110
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-7

Case: 78
Age: 4-0
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 8

Case: 8
Age: 4-8
Sex: F
Religion: Catholic
Socio-economic Status: 5
Family Position: 4th of 6*
IQ: 110
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	NR
500	95	NR
1k	105	NR
2k	105	NR
4k	110	NR
8k	NR	NR

Amplification Initiated: 3-1

Case: 79
Age: 4-11
Sex: F
Religion: Catholic
Socio-economic Status: 5
Family Position: 4th of 6
IQ: 118
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

*Three older siblings were no longer living in the home.

APPENDIX A - Continued

Pair 9

Case: 9
Age: 4-2
Sex: F
Religion: Catholic
Socio-economic Status: 4
Family Position: Only child
IQ: 99
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	65
500	85	75
1k	110	75
2k	NR	70
4k	NR	55
8k	NR	65

Amplification Initiated: 2-9

Case: 80
Age: 3-11
Sex: F
Religion: Catholic
Socio-economic Status: 4
Family Position: Only child
IQ: 100
Race: Caucasian
Family Position: PNLT

Hearing Status:

Normal

Pair 10

Case: 10
Age: 5-8
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2*
IQ: 97
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	80
500	95	100
1k	105	90
2k	105	75
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-0

Case: 81
Age: 5-7
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 112
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*An older sibling was enrolled in a residential school for the deaf and was not considered as part of the birth count.

APPENDIX A - Continued

Pair 11

Case: 11
Age: 5-3
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 96
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	85	90
500	105	95
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-5

Case: 82
Age: 5-1
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 92
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 12

Case: 12
Age: 5-1
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 4th of 5
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	60	70
500	60	75
1k	65	70
2k	55	60
4k	60	55
8k	65	65

Amplification Initiated: 4-9

Case: 83
Age: 5-1
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 4th of 5*
IQ: 112
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*One older sibling was no longer living in the home.

APPENDIX A - Continued

Pair 13

Case: 13
Age: 3-11
Sex: M
Religion: Jewish
Socio-economic Status: 4
Family Position: One of two*
IQ: 85
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	60	65
500	80	85
1k	105	100
2k	95	90
4k	100	90
8k	NR	75

Amplification Initiated: 2-4

*This child is one of a pair of twins.

Case: 84
Age: 4-1
Sex: M
Religion: Jewish
Socio-economic Status: 4
Family Position: 1st of 2
IQ: 100
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 14

Case: 14
Age: 3-6
Sex: F
Religion: Jewish
Socio-economic Status: 3
Family Position: Only child*
IQ: 120
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	90
500	95	95
1k	100	105
2k	110	110
4k	110	110
8k	NR	NR

Amplification Initiated: 1-7

*Two older siblings were no longer living in the home.

Case: 85
Age: 3-5
Sex: F
Religion: Jewish
Socio-economic Status: 3
Family Position: Only child
IQ: 130
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 15

Case: 15
Age: 3-9
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: 2nd of 2
IQ: 101
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	55
500	60	60
1k	65	65
2k	70	70
4k	85	95
8k	NR	NR

Amplification: Did not have a hearing aid.

Case: 86
Age: 3-10
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: 2nd of 2
IQ: 92
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 16

Case: 16
Age: 4-9
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: 2nd of 3
IQ: 129
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-6

Case: 87
Age: 4-6
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: 2nd of 3
IQ: 133
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 17

Case: 17
Age: 5-0
Sex: M
Religion: Catholic
Socio-economic Status: 4
Family Position: Only child
IQ: 91
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	90	90
500	105	110
1k	105	105
2k	110	105
4k	105	85
8k	90	70

Amplification Initiated: 2-6

Case: 88
Age: 4-8
Sex: M
Religion: Catholic
Socio-economic Status: 4
Family Position: Only child
IQ: 91
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

Pair 18

Case: 18
Age: 4-7
Sex: F
Religion: Catholic
Socio-economic Status: 4
Family Position: 1st of 3*
IQ: 122
Race: Negro
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	75
500	70	80
1k	80	90
2k	70	90
4k	85	90
8k	70	NR

Amplification Initiated: 4-0

Case: 89
Age: 4-9
Sex: F
Religion: Catholic
Socio-economic Status: 4
Family Position: 1st of 3
IQ: 118
Race: Negro
Family Situation: PLT

Hearing Status:

*An older sibling died and was not counted as part of the birth order.

APPENDIX A - Continued

Pair 19

Case: 19
Age: 4-9
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 96
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	85
500	100	105
1k	100	105
2k	100	100
4k	85	105
8k	NR	NR

Amplification Initiated: 2-10

Case: 90
Age: 4-11
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 108
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 20

Case: 20
Age: 5-8
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 91
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	65	50
500	70	65
1k	75	90
2k	80	110
4k	90	110
8k	NR	NR

Amplification Initiated: 3-8

Case: 91
Age: 5-10
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 105
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 21

Case: 21
Age: 4-5
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: Only child
IQ: 101
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	45	55
500	55	60
1k	80	90
2k	85	85
4k	90	75
8k	70	65

Amplification Initiated: 4-4

Case: 92
Age: 4-7
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: Only child
IQ: 99
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 22

Case: 22
Age: 5-2
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 94
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	85	80
500	95	80
1k	90	80
2k	70	70
4k	75	60
8k	80	NR

Amplification Initiated: 4-2

Case: 93
Age: 5-6
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 103
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 23

Case: 23
Age: 4-4
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 104
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	NR
500	60	85
1k	55	85
2k	55	85
4k	60	95
8k	60	NR

Amplification Initiated: 3-6

Case: 94
Age: 4-7
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 93
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 24

Case: 24
Age: 4-11
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 127
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	85
500	100	100
1k	100	105
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-10

Case: 95
Age: 4-11
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 137
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*An older sibling was no longer living in the home.

APPENDIX A - Continued

Pair 25

Case: 25
Age: 4-10
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: 3rd of 3
IQ: 91
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Case: 96
Age: 5-2
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: 3rd of 3
IQ: 98
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Amplification Initiated: Did not have a hearing aid.

Pair 26

Case: 26
Age: 5-0
Sex: F
Religion: Protestant
Socio-economic Status: 5
Family Position: 6th of 6
IQ: 92
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	50
500	65	50
1k	75	65
2k	90	70
4k	NR	65
8k	NR	60

Case: 97
Age: 4-10
Sex: F
Religion: Protestant
Socio-economic Status: 5
Family Position: 6th of 8*
IQ: 99
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Amplification Initiated: Did not have a hearing aid.

*There were two sets of twins, which made six births but eight children.

APPENDIX A - Continued

Pair 27

Case: 27
Age: 5-5
Sex: M
Religion: Jewish
Socio-economic Status: 2
Family Position: 1st of 2
IQ: 116
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	20	15
500	40	25
1k	85	50
2k	75	50
4k	70	60
8k	70	65

Amplification Initiated: 5-2

Case: 98
Age: 5-5
Sex: M
Religion: Jewish
Socio-economic Status: 2
Family Position: 1st of 2
IQ: 109
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 28

Case: 28
Age: 5-5
Sex: M
Religion: None
Socio-economic Status: 4
Family Position: 2nd of 2*
IQ: 100
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	80
500	105	100
1k	110	105
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 4-1

Case: 99
Age: 5-9
Sex: M
Religion: None
Socio-economic Status: 4
Family Position: 2nd of 2
IQ: 93
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*An older sibling was placed in a home for the mentally retarded and was not counted as part of the birth order.

APPENDIX A - Continued

Pair 29

Case: 29
Age: 5-11
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 129
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	50
500	60	70
1k	75	75
2k	45	60
4k	105	NR
8k	NR	NR

Amplification Initiated: 4-11

Case: 100
Age: 5-7
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 124
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 30

Case: 30
Age: 3-8
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	90
500	100	100
1k	100	110
2k	90	90
4k	95	100
8k	80	80

Amplification Initiated: 2-3

Case: 101
Age: 3-5
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 117
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 31

Case: 31
Age: 5-10
Sex: M
Religion: Catholic
Socio-economic Status: 4
Family Position: 3rd of 3
IQ: 96
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	45
500	65	55
1k	55	55
2k	60	65
4k	55	95
8k	60	NR

Amplification Initiated: 5-0

Case: 102
Age: 5-7
Sex: M
Religion: Catholic
Socio-economic Status: 4
Family Position: 3rd of 3
IQ: 99
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 32

Case: 32
Age: 4-5
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: Only child
IQ: 105
Race: Negro
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	85	70
500	105	85
1k	105	85
2k	NR	85
4k	NR	75
8k	NR	75

Amplification Initiated: 2-6

Case: 103
Age: 4-7
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: Only child
IQ: 112
Race: Negro
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 33

Case: 33
Age: 5-2
Sex: M
Religion: None
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 96
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-11

Case: 104
Age: 5-2
Sex: M
Religion: None
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 85
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 34

Case: 34
Age: 4-6
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 2nd of 3
IQ: 115
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	80
500	NR	110
1k	110	110
2k	100	110
4k	100	90
8k	NR	90

Amplification Initiated: 2-5

Case: 105
Age: 4-8
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 2nd of 3
IQ: 102
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 35

Case: 35
Age: 5-8
Sex: F
Religion: Catholic
Socio-economic Status: 4
Family Position: Only child
IQ: 103
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	70
500	95	85
1k	100	95
2k	NR	110
4k	NR	NR
8k	NR	NR

Amplification Initiated: 5-6

Case: 106
Age: 5-8
Sex: F
Religion: Catholic
Socio-economic Status: 4
Family Position: Only child*
IQ: 101
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

*An older sibling died and was not counted as part of the birth order.

Pair 36

Case: 36
Age: 5-10
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	30	70
500	50	70
1k	70	80
2k	90	95
4k	95	100
8k	80	95

Amplification Initiated: 5-6

Case: 107
Age: 5-7
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 105
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 37

Case: 37
Age: 4-9
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 131
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	75
500	95	95
1k	90	95
2k	100	90
4k	100	85
8k	NR	NR

Amplification Initiated: 2-6

Case: 108
Age: 4-10
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 124
Race: Caucasian
Family Situation: PLT

Hearing Status:

Pair 38

Case: 38
Age: 5-5
Sex: M
Religion: Protestant
Socio-economic Status: 1
Family Position: 3rd of 4
IQ: 101
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	45	75
500	55	95
1k	65	100
2k	65	105
4k	75	105
8k	90	NR

Amplification Initiated: 2-11

Case: 109
Age: 5-3
Sex: M
Religion: Protestant
Socio-economic Status: 1
Family Position: 3rd of 4
IQ: 101
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 39

Case: 39
Age: 4-10
Sex: M
Religion: Protestant
Socio-economic Status: 2
Family Position: Only child
IQ: 107
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	75	65
500	75	70
1k	80	80
2k	85	80
4k	80	80
8k	85	95

Amplification Initiated: 3-6

Case: 110
Age: 4-10
Sex: M
Religion: Protestant
Socio-economic Status: 2
Family Position: Only child
IQ: 116
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 40

Case: 40
Age: 4-9
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: Only child
IQ: 100
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	60	NR
500	80	110
1k	80	NR
2k	80	NR
4k	85	NR
8k	90	NR

Amplification Initiated: 2-0

Case: 111
Age: 5-2
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: Only child
IQ: 108
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 41

Case: 41
Age: 4-4
Sex: M
Religion: Protestant
Socio-economic Status: 2
Family Position: Only child
IQ: 98
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	75	85
500	85	90
1k	90	85
2k	90	85
4k	80	90
8k	NR	NR

Amplification Initiated: 2-5

Case: 112
Age: 4-8
Sex: M
Religion: Protestant
Socio-economic Status: 2
Family Position: Only child
IQ: 99
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 42

Case: 42
Age: 4-7
Sex: F
Religion: Protestant
Socio-economic Status: 2
Family Position: Only child
IQ: 103
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-10

Case: 113
Age: 4-7
Sex: F
Religion: Protestant
Socio-economic Status: 2
Family Position: Only child
IQ: 104
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 45

Case: 45
Age: 5-2
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 108
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	70
500	85	70
1k	110	80
2k	NR	80
4k	NR	90
8k	NR	95

Amplification Initiated: 2-6

Case: 116
Age: 5-2
Sex: F
Religion: Protestant
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 111
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 46

Case: 46
Age: 5-5
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 5th of 8
IQ: 99
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	NR
500	85	105
1k	105	105
2k	105	105
4k	105	105
8k	NR	NR

Amplification Initiated: 3-0

Case: 117
Age: 5-7
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 5th of 8*
IQ: 87
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*Two older siblings died and were not counted as part of the birth order.

Pair 43

Case: 43
Age: 4-8
Sex: F
Religion: Protestant
Socio-economic Status: 2
Family Position: 1st of 2
IQ: 105
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-11

Case: 114
Age: 4-9
Sex: F
Religion: Protestant
Socio-economic Status: 2
Family Position: 1st of 2
IQ: 104
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

Pair 44

Case: 44
Age: 4-10
Sex: F
Religion: None
Socio-economic Status: 5
Family Position: 1st of 4
IQ: 114
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	90	NR
500	95	110
1k	105	NR
2k	110	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-8

Case: 115
Age: 4-9
Sex: F
Religion: None
Socio-economic Status: 5
Family Position: 1st of 4*
IQ: 101
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

*An older sibling was no longer living in the home.

APPENDIX A - Continued

Pair 47

Case: 47
Age: 3-11
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 3rd of 4
IQ: 93
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	90
500	110	110
1k	110	110
2k	110	110
4k	110	110
8k	NR	NR

Amplification Initiated: 2-3

Case: 118
Age: 4-1
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 3rd of 4
IQ: 104
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

Pair 48

Case: 48
Age: 4-0
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 124
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	70	70
500	70	75
1k	65	70
2k	70	65
4k	75	70
8k	80	80

Amplification Initiated: 3-7

Case: 119
Age: 4-3
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 120
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 49

Case: 49
Age: 3-11
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 3rd of 3*
IQ: 103
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	60	65
500	90	85
1k	105	100
2k	105	NR
4k	100	NR
8k	NR	NR

Amplification Initiated: 2-10

Case: 120
Age: 3-8
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 3rd of 3
IQ: 113
Race: Caucasian
Family Situation: PNLT

Hearing Status:

*Three older siblings were no longer living in the home, and a younger sibling died and was not counted in the birth order count.

Pair 50

Case: 50
Age: 3-7
Sex: F
Religion: Jewish
Socio-economic Status: 2
Family Position: Only child*
IQ: 129
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-0

Case: 121
Age: 4-0
Sex: F
Religion: Jewish
Socio-economic Status: 2
Family Position: Only child
IQ: 119
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*An older sibling is attending a residental school for the deaf, and was not counted as part of the birth order.

APPENDIX A - Continued

Pair 51

Case: 51
Age: 4-8
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 105
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	55
500	65	65
1k	80	75
2k	90	90
4k	90	100
8k	NR	NR

Amplification Initiated: 4-0

Case: 122
Age: 5-0
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: Only child
IQ: 96
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 52

Case: 52
Age: 4-4
Sex: M
Religion: None
Socio-economic Status: 2
Family Position: Only child
IQ: 120
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	100	105
1k	100	110
2k	100	110
4k	100	110
8k	100	110

Amplification Initiated: 2-6

Case: 123
Age: 4-0
Sex: M
Religion: None
Socio-economic Status: 2
Family Position: Only child
IQ: 123
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 53

Case: 53
Age: 4-10
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 1st of 2
IQ: 110
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	90	90
500	105	110
1k	105	110
2k	110	110
4k	110	110
8k	NR	NR

Amplification Initiated: 3-7

Case: 124
Age: 5-1
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 1st of 2
IQ: 115
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

Pair 54

Case: 54
Age: 4-11
Sex: F
Religion: Protestant
Socio-economic Status: 2
Family Position: 2nd of 2
IQ: 111
Race: Negro
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	75
500	70	80
1k	85	90
2k	85	110
4k	85	NR
8k	NR	NR

Amplification Initiated: 3-6

Case: 125
Age: 4-9
Sex: F
Religion: Protestant
Socio-economic Status: 2
Family Position: 2nd of 2
IO: 103
Race: Negro
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 55

Case: 55
Age: 4-10
Sex: M
Religion: Catholic
Socio-economic Status: 2
Family Position: 1st of 2
IQ: 123
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	50
500	55	60
1k	90	90
2k	95	110
4k	NR	NR
8k	NR	NR

Amplification Initiated: 4-0

Case: 126
Age: 4-6
Sex: M
Religion: Catholic
Socio-economic Status: 2
Family Position: 1st of 2
IQ: 123
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 56

Case: 56
Age: 4-3
Religion: Catholic
Socio-economic Status: 4
Family Position: 3rd of 4
IQ: 102
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	85	80
500	95	80
1k	90	80
2k	90	85
4k	110	90
8k	NR	NR

Amplification Initiated: 4-0

Case: 127
Age: 4-7
Religion: Catholic
Socio-economic Status: 4
Family Position: 3rd of 4
IQ: 93
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 57

Case: 57
Age: 5-4
Sex: F
Religion: Catholic
Socio-economic Status: 5
Family Position: 4th of 5
IQ: 121
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	NR
500	60	110
1k	60	NR
2k	60	NR
4k	75	NR
8k	80	NR

Amplification Initiated: 4-8

Case: 128
Age: 5-0
Sex: F
Religion: Catholic
Socio-economic Status: 5
Family Position: 4th of 5
IQ: 122
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

Pair 58

Case: 58
Age: 5-0
Sex: M
Religion: Protestant
Socio-economic Status: 1
Family Position: 3rd of 3
IQ: 115
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	110	NR
1k	110	NR
2k	110	NR
4k	110	NR
8k	NR	NR

Amplification Initiated: 3-0

Case: 129
Age: 4-11
Sex: M
Religion: Protestant
Socio-economic Status: 1
Family Position: 3rd of 3
IQ: 111
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 59

Case: 59
Age: 5-1
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 4th of 5*
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	110	105
1k	110	110
2k	110	110
4k	110	110
8k	NR	NR

Amplification Initiated: 5-0

Case: 130
Age: 5-3
Sex: M
Religion: Protestant
Socio-economic Status: 5
Family Position: 4th of 5
IQ: 103
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

*An older sibling was no longer living in the home.

Pair 60

Case: 60
Age: 4-0
Sex: F
Religion: None
Socio-economic Status: 5
Family Position: 5th of 5
IQ: 95
Race: Negro
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	50
500	70	75
1k	80	95
2k	110	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-11

Case: 131
Age: 4-1
Sex: F
Religion: None
Socio-economic Status: 5
Family Position: 5th of 5
IQ: 100
Race: Negro
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 61

Case: 61
Age: 4-10
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: Only child*
IQ: 120
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	45
500	85	85
1k	90	100
2k	90	110
4k	90	110
8k	90	NR

Case: 132
Age: 4-6
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: Only child
IQ: 123
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Amplification Initiated: 2-6

*An older sibling was in a residential school for the deaf and was not counted as part of the birth order count.

Pair 62

Case: 62
Age: 5-11
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 113
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	NR
500	110	105
1k	110	110
2k	NR	NR
4k	NR	NR
8k	NR	NR

Case: 133
Age: 5-11
Sex: M
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child*
IQ: 117
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Amplification Initiated: 3-7

*There was a twin, who died at birth.

APPENDIX A - Continued

Pair 63

Case: 63
Age: 5-6
Sex: M
Religion: Jewish
Socio-economic Status: 2
Family Position: 3rd of 3
IQ: 118
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	50	50
500	60	70
1k	80	75
2k	80	80
4k	105	90
8k	NR	80

Amplification Initiated: 3-10

Case: 134
Age: 5-6
Sex: M
Religion: Jewish
Socio-economic Status: 2
Family Position: 3rd of 3
IQ: 112
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 64

Case: 64
Age: 5-3
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 100
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	90
500	90	110
1k	90	110
2k	95	NR
4k	90	NR
8k	95	NR

Amplification Initiated: 2-2

Case: 135
Age: 5-4
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 1st of 2
IQ: 97
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 65

Case: 65
Age: 5-0
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 95
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	55	NR
500	70	NR
1k	80	NR
2k	95	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-6

Case: 136
Age: 5-0
Sex: M
Religion: Protestant
Socio-economic Status: 3
Family Position: 2nd of 2
IQ: 97
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 66

Case: 66
Age: 4-9
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: Only child
IQ: 113
Race: Negro
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 2-1

Case: 137
Age: 4-7
Sex: M
Religion: Protestant
Socio-economic Status: 4
Family Position: Only child
IQ: 114
Race: Negro
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 67

Case: 67
Age: 5-10
Sex: M
Religion: Catholic
Socio-economic Status: 2
Family Position: 2nd of 2
IQ: 109
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	110	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-2

Case: 138
Age: 5-10
Sex: M
Religion: Catholic
Socio-economic Status: 2
Family Position: 2nd of 2
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 68

Case: 68
Age: 3-5
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: 3rd of 3
IQ: 115
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	80
500	90	90
1k	110	110
2k	110	110
4k	NR	110
8k	NR	NR

Amplification Initiated: 2-7

Case: 139
Age: 3-7
Sex: M
Religion: Catholic
Socio-economic Status: 1
Family Position: 3rd of 3
IQ: 123
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 69

Case: 69
Age: 5-6
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 120
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	80	70
500	95	85
1k	100	95
2k	110	110
4k	NR	NR
8k	NR	NR

Amplification Initiated: 4-6

Case: 140
Age: 5-9
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: Only child
IQ: 120
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

Pair 70

Case: 70
Age: 4-4
Sex: M
Religion: Catholic
Socio-economic Status: 5
Family Position: 2nd of 2
IQ: 113
Race: Caucasian
Family Situation: PNLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	NR	NR
1k	NR	NR
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 4-0

Case: 141
Age: 4-6
Sex: M
Religion: Catholic
Socio-economic Status: 5
Family Position: 2nd of 2
IQ: 111
Race: Caucasian
Family Situation: PNLT

Hearing Status:

Normal

APPENDIX A - Continued

Pair 71

Case: 71
Age: 4-6
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 3rd of 3
IQ: 110
Race: Caucasian
Family Situation: PLT

Hearing Status:

	Rt. ear	Lt. ear
250	NR	NR
500	110	105
1k	NR	110
2k	NR	NR
4k	NR	NR
8k	NR	NR

Amplification Initiated: 3-2

Case: 142
Age: 4-8
Sex: F
Religion: Catholic
Socio-economic Status: 3
Family Position: 3rd of 3
IQ: 114
Race: Caucasian
Family Situation: PLT

Hearing Status:

Normal

APPENDIX B

EXAMPLES OF PROTOCOLS DEVELOPED DURING PILOT PROJECT FROM WHICH THE ACTIVITY AND OBJECT DIMENSION SCORING PROCEDURES WERE DEVELOPED

Mariam T.

She is standing looking at the stove pulls at her dress and starts crawling across the floor to the ironing board sits down at the ironing board but stares at the dolls then begins ironing with the iron pushing across the table with her left hand and picks up the cord with her right handlooks behind the ironing board and underneath it at the cord still siittiing on the floor she pushes the iron with her hand and looks over at the floor she is ironing with her right hand now as she is looking up at the dolls stops that its back on the floor stands up making babbling noises walks over to the bulldozer picks it up puts it on the floor as she scans the chalk board sits down pulls the scoop pushes the bulldozer forward then moves the lever to pull the scoop up she pulls the scoop up with her ~~xxdx~~ handx as she is pulling the lever pushes the lever down releasing the scoop ushes the bulldozer forward pulls at the smoke stack picks it up by the scoopputs it ack on the top shelf - picks up the wrecker from the top shelf puts it on the floor pushes t forward ~~xxxxxxx~~ crawling behind it she crawls behind it pushing it in front of her looking s she goes at what she is approaching looks up at the chalk board kneels looks up pushes he wrecker forward toward the ironing board making slight noises to herself pushes the recker forward back toward the shelf pulls at her dress stands up puts the wrecker back uts her hand to her mouth and walks toward the chalk board picks up a piece of chalk begins riting on the board looks down at the chalk shelf continues writing puts the chalk down icks up the chalk duster looks underneath it puts it back down still holding on to it ontinues mukking looks acorss the room at the wall above the sink puts the eraser to her outh puts the chalk down turns around and erases what she had put on the board scratches er head looks at the dolls touches ~~thxx~~ her glasses walks over to the mirror then touches e scale pushing it up by pushing underneath the bar looking down at the pan opposite her lls the bar down tilting the scale she is tilting the scale ~~dx~~ now by pushing down on top of the bar looks up in/the mirror at herself rubes her dress pulls at the hem of her dr walks toward the toys looking at the pull toy walks away scratching walks to the sink turns the tap on turns it off touches the utensils bends over opens the door of the sink looks in and closes it, looks at the sweeping utensils the stove pulls up at her dress and puts the hem of her dress in her mouth as she scans the dolls looks up at the mirror kneels down and goes to the drum on the second shelf takes it off the shelf ~~put~~ puts it on the floor and begins beating it with the drumstick looks up at the toys looks back at the drum looks over at the scale looks up at the toys still beating the drum keeps beating the drum looks over at the toys - handles one of the cars on the shelf staring at the toys as she is beating the drum picks up the stuffed toys looks down at the drum as she keeps beating it holds the drum stick by the knob then holds it by the end of the stick puts the drum back on the second shelf where she got it she walks away pulling at the hem of her dress scratching her head looks at herself in the mirror still scratching her head ~~she puts the drum back on the second shelf~~ she touches her glasses yawns rubes her stomach goes to the sink touches the burner pulls at the hem of her dress looks at the stove walks to the mirror looks ~~at in~~ in pulls the hem of ~~the~~ her dress up scans the toys scans the dolls looks at herself in the mirror walks over to the scale pushes down on the scale pushing it down and looks at the pan and the other part of the scale releases the scale looks up at herself in the mirror walks away pulling at the hem of her dress walks over to the toys looking at the toys scratches herself kneels down starts to pick out the foam blocks on the second shelf stands up handles the hem of her dress looks up at the mirror looks at the chalk board walks back toward the other mirror looks at the wall looks at the cut out animal on the wall leans against the wall looking up at it still pulling at her dress hem walks away from the wall pulling at her hem holds the dress up to her shoulders spins around looks over at the wall sits down on the floor in front of the toys leans over them picks out the pull toy that was on

the bottom shelf puts it back takes out the puzzle and dumps all the parts of the puzzle
out she turns the pieces over so that the painted side is showing tries to put the head
of the dog in cannot - holds it up looks at it looks back the puzzle puts it back down
on the floor picks up the bone of the puzzle and tries to place it in the puzzle the
uzzle is upside down to her puts it back on the floor picks up the body of the dog
annot put it in puts it back on the floor picks up another piece cannot put it in touches
he puzzle picks up the bone again and tries to place it in cannot (leans over on one elbow)
icks up another piece cannot put it in picks up the head of the dog and tries to fit
nother piece in with this piece as she holds it in the air she fits the tow pieces together
hen takes the tow pieces to the puzzle but cannot fit it in ~~pickx~~ takes the puzzle pieces
part and puts them back together dorps one of the pieces onto the floor then puts the
her piece back in the pile looks at the toys on the shelf scratches looks back at the
zzle picks up the head of the dog again tries to put it in but it is upside down
e entire puzzle is still upsidedown to her she leans over on her elbow tries to put the
ad of the dog in puts the puzzle back on the floor looks over at the floor picks up
e bone almost gets bone in place takes it out and then puts it back in place -takes her
nds away and looks at the puzzle picks up the head of the dog puts it back on the floor
cks up the body starts to put it in stops then does put it in takes her hands away and
oks at the puzzle she puts the body of the dog in place puts the head almost in place and
n takes it back out tries to put another part of the body in place turns it around right
s it in place scratches picks up another piece of puzzle tries to put it in place puts
ther piece in place -still another - she is babbling to herself - tries to put another
ce in place but cannot - tries another - tries it two or three different ways but cannot
it in place tries to put the head in again but cannot - she is talking to herself all
while she is working on the puzzle - tries to get the ear in but will not fit tries
ther piece turns it over and over tries to put the head in again cannot get it in place

tries to put another piece in cannot get it in place - tries again puts it back on the floor tries another piece looks up at the toys scratches - looks over at herself in the mirror puts the piece of puzzle to her mouth tries to fit it in place will not fit - almost gets it in place leans over on one arm again but cannot get it in place finally fits it in place sits back and looks at the puzzle holding onto her leg -picks up another piece tries to get it in place but it will not fit - only two pieces left the head and another piece which is the top piece of the puzzle puts the face of the dog in place then places the last piece in smoothes the pieces in place kneels on top of the puzzle with her knees reaches over and picks out the cat puzzle leans back (touching the dog puzzle) sighing puts the dog puzzle back on the bottom shelf and empties the peices of the cat puzzle onto the floor ~~the~~ and taps on the back of the puzzle to get them out picks up the head of the cat (the puzzle is upside down to her also) now on the side of the puzzle puts the head of the cat in puts another piece in place tries to fit another tries to fit a piece of the body of the cat in place picks it out and puts it back on the floor tries to fit another piece puts it back on the floor another - another - and tries to fit it in two different places has it in place but then takes it out puts it back on the floor tries to fit another piece fits it in place tries another scratches her head (slaps her leg) picks up another piece puts it in place takes out a piece she had in place already and puts it on the floor fits another and scratches her nose trying to fit another piece in place scratches her mouth tries to fit another piece picks up a large piece of the body puts it back on the floor another piece of the body fits it in place picks up a piece of the body again and tries to fit it in place succeeds she takes out another piece of puzzle so that it will fit in and then puts that piece back in place tries to fit another piece in puts it back on the floor places the bow of the cat in place she has two pieces left she gets one - takes out three pieces so she can get the last piece in place then she tries to put those pieces she has just taken out back in place - she fits the first one the second one then tries to get the third piece in cannot so she just leaves it on top of the puzzle as if it waere in place and puts the puzzle back on the bottom shelf looks over at the scale scratches stands up pulls the puzzle box kneels down and places it on the floor opens the top of the puzzle box scrathces touches the top of the puzzle box looks inside sighs STILL scratching - scratching - closes the lid of the puzzle box and puts it back on the shelf stands up ----end ------

Mariam T.

Mariam is standing in front of the sink gets down on her knees and crawls over to the ironin board sits down in front of the ironing board is scanning the room takes up the iron and starts playing with the attachment of the iron -she takes the iron and makes some ironing motions she is still seated on the floor she turns looks about the room makes some noises stands up walks over to the bookshelf touches the crane takes the crane and puts it down on the floor manipulates the scoopers by hand pushes the crane turns it around manipulates the lever of the cranes then manipulates it manually -pushes the lever down pushes it forward plays with the top portion of the crane and picks it up puts it back on the top shelf goes over to thw wrecker touches the wrecker pulls down the wrecker puts the wrecker down on the floor and pushes it around -walks on her hands and knees with the wrecker over toward the doll bed as she is doing this she scans the room she gets up on her knees she is still walking on her hands and knees with the wrecker past the bed she stops scans the room turns around is is going back the same direction with the wrecker on her hands and knees she picks it up puts the wrecker down turns around walks over to the chalk board and as she is doing this she is tapping her lips she looks down at the chalk board picks up a piece of chalk and begins ~~to write~~ draw on the chalk board looks like she is making a rectangle now she is making a straight line which becomes a curve line she is just scribbling-she turns looks about the room picks up the eraser puts it up to her chin turns around takes the eraser and begins to erase she puts her hand on the chalk board she takes her hand off puts the eraser down turns around and walks away begins to look at the bed she looks in the mirror adjusts her glasses starts playing with the scale tilting it -she is tilting it back and forth she continues to tilt it she looks in the mirror turns around ~~walks~~ wipes her dress begins to pull up her panties walks past the bookshelf looks at the various toys walks past it walks over to the sink is beginning to play with the knobs on the sink walks past the utensils looks at them opens the bottom door of the sink looks in closes it she walks about the room looking puts her dress in her mouth falls on the floor right in front of the bookshelf takes out the drum and starts beating the drum after she has taken it out and has put it on the floor - as she is doing this she is looking about the ~~room~~ bookshelf -she doing the same thing stops -focuses in on the puzzle box -touches the puzzle box stops starts beating again and examins the bookshelf -she looks up about the room she is ~~whil~~ whistling and is still beating the drum she stops takes the drumstick puts it in her hand stand s up and as she does this she picks up the drum puts it back on the second shelf with the drumstick stands up examines the various toys on the bookshelf walks past the scale she is twirling with her hair looks in the mirror turns around adjusts her glasses yawns walks over to the stove touches some of the things on the stove looks about the room looks in the mirror and as she is doing this she is playing with her dress she turns around walks back around the room and she is playing with her dress she walks over to the scale and she begins to tilt the scale she tilts one end of the scale pushes it down and begins to release it she stops looks in the mirror is playing with her dress again -walks over to the bookshelf looking at the various things on the bookshelf still playing with her dress she begins to take out the cotton blocks she changes her mind leaves them back in stands up -still playing with her dress walking about the room turns goes back toward the bookshelf looks in the mirror still playing with her dress she walks over looks at the decal beside the mirror puts her hand on the wall starts to walk away stops looks back at the decal still playing with her dress -she walks over to the bookshelf plays with her dress turns around sits down in front of the bookshelf looks around the room then focuses in on the train and picks up the pull train that is on top of the puzzle takes out one of the puzzles and puts back on the other puzzle and turns the frame over dropping the pieces on the pussle has the frame upside down she now turns all the pieces over she picks up the head piece tries to fit it in the correct area but seems to be confused by the upside down frame she examines the piece she now picks up the bone piece and tries to fit in gets confused puts it back on the floor picks up the body piece tries to fit it in can't puts it back tries another body piece puts it back she looks at the pieces looks at the frame picks up the bone piece examines it gets on her side puts it back picks up a ear piece tries to fit it in can't she puts it on the head piece she takes the two pieces and tries to put them together separately doesn't now picks up the correct two pieces and puts them together which forms the head piece now she puts the head piece down on the frame and tries to fit it in but doesn't seem to be able to the frame is still upside down she ~~puts the two~~ picks up the two pieces puts them together drops the one piece still tries to get the piece to fit in the frame but doesn't seem to be able to sh is ~~still~~ sitting there looking about she looks on the shelf she begins to play with her dress she is shaking her head she has the head piece she tries to put it but is trying to put it in upside down she turns the head piece around is trying to get into the frame doesn't seem to be able to get it in the frame she take the piece out brings it back looks about the bookshelf picks up the dog bone piece trying to get it in almost has it in now she knows where it goes and she puts it in correctly she picks up the head piece and starts to put it in and changes her mind takes up a body piece looks starts to put it down then looks and knows where it goes and puts it in place picks up the head piece knows where it goes and tries to get it in can't puts it away picks up the second body piece has it upside down but has it in the general area ~~tur~~ turns it around puts it in correctly -starts to pick up the head piece doesn't picks up a ear piece puts it down picks up a second ear piece and puts it down picks up the spot piece and puts it ~~down~~ in correctly picks up the tail piece puts it in correctly holds plays with it and ~~then takes up the fire hydrant and starts to blow into the fire hydrant while manipulating~~ the ~~end of the smaller hose puts the~~

now she pick up the head piece looks at it examines it and puts it down picks up the ear piece
tries to fit it in doesn't puts it away tries the second ear piece tries to fit it in the
frame and can't she is manipulating it around trying to fit it in she is whispering at
the same time she takes up the head piece has it upside down can't get it in has a second
ear piece can't get it in has the first ear piece knows where it goes and is fitting it
around and gets it in and is successful picks up the head piece turns it around and tries
to fit it in but does not seem able to do that -picks up the second ear piece tries to fit
it by the first ear piece does't succeed she puts it down take sthe middle portion of
the head can't put it in manipulates it around puts it back on the floor puts up the second
ear piece tries to fit it in by the bone doesn't can't stops looks about the room she
starts to itch herself she is sitting there looking about the room looking at the
mirror with the dog piece in her hand picks up the dog piece to her mouth goes down
tries to put it in can't do it -she still has it in the wrong area - she is just fitting
it in ramdomly picks up the piece drops it picks it up and starts to fit it in she
doesn't seem to be able to she fits it in in the right area sits back and smiles - picks
up the middle head portion tries to fit it in can't picks up the head has it upside down
drops it in and
she turns it around and gets it in correctly as she/puts it in and picks up
last remaining piece and puts it in correctly - she then comes around and looks at it and
now sits on it she gets off she comes over pushes the train out of the way takes out the
second puzzle turns around and picks up the puzzle she just completed and puts it back on
the shelf turns around and Now has the second puzzle turns it over dropping the pieces on
the floor she hits out the remaining pieces she puts the frame down and it is still upside
own she adjusts herself so that she is looking at it side ways she picks up the head
she has it upside down
piece/and turns it around and puts it in correctly - picks up a pawl piece

and puts it in correctly -she picks up a pawl tries to fit it in can't - she picks up a body piece looks at it tries to fit it in [illegible] doesn't seem to be able to she randomly places it in position she looks at it and puts it down -picks up a second body piece tries to fit it in can't she picks up a white spot she can't fit it in she is putting it randomly in various places puts it in can't picks up the pawl piece and puts it in the correct place doesnt know it takes it out then puts it back where it was - takes the white piece tries to fit it in can't she picks up a body piece throws it aside picks up a second ~~pawl~~ ball piece and puts it in but it is in the wrong place - picks up a third ball piece puts it in correctly she says no that no right -she takes out the middle portion and tries to put the outer portion in and then she puts the middle portion in - and now it looks right she tries to put a pawl piece in it doesn't look right -she tries to put a body piece in no it doesn't look right she puts in a second body piece with the tail and gets it in correctly but having a hard time putting it into the frame she does she succeeds she picks up a second ~~p~~ body piece tries to fit it in now she knows where it goes and she puts it in correctly -now she takes out the ball piece tries to put it in differently and it is in wrong she takes the white piece and tries to put it in and it dows not fit she takes the bow she puts it in correctly now she has two pieces left over but because the ball pieces are in wrong she can't put them in so she is just putting them in randomly she puts in the white piece corectly she takes out all the ball pieces and puts the pawl in and that is correct and she tries put one of the ball pieces in does not succeed puts in one of the ball pieces correctly and tries to put in the other ball piece but puts it incorrectly and tries to put in the third ball piece but it is in incorrectly so she just leaves it --she puts the puzzle frame back on the shelf -she is now sitting in front of the shelf scratching herself stands up walks over to puzzle box puts the puzzle box down on the floor scratches herself opens the top of the puzzle box ~~up~~ scratches herself again adjusts herself she is adjusting herself trying she puts the puzzle box top down stands up and looks as if she must go to potty --end.---

APPENDIX C

ACTIVITY DIMENSION SCORING SHEET

CODE FOR INDIVIDUAL PROTOCOL (ACTIVITIES)

I. LOCOMOTION:

   A. Moving General - Moving about the room with no intent in mind

   B. Moving Specific - Moving from one definite point to another

   C. Sitting

   D. Standing without Movement

   E. Laying

   F. Leaving Room:

      1. Starts to leave the room, but doesn't

      2. Actually leaves the room - leaving being defined as having both feet beyond the threshold of the door

   G. Stooping

   H. Bending Over

   I. Crawling

   J. Dancing or Jumping

II. HANDLING:

   A. Picks Up

   B. Puts Down

   C. Puts Back

   D. Drops Object

   E. Throws

   F. Catches

   G. Carries or Holds

   H. Pushes

   I. Falls off Object such as a Chair

CODE FOR INDIVIDUAL PROTOCOL (ACTIVITIES) - Continued

III. SELF STIMULATION:

- A. Touches or Manipulates Self
- B. Touches or Manipulates Clothes
- C. Looks Carefully at Self
- D. Looks Carefully at Clothes
- E. Communication with Self:
  - 1. Mouthing
  - 2. Humming
  - 3. Sound appropriate to situation
  - 4. Sound part of vocal play
  - 5. Sound of distress
  - 6. Random sounds - coughs, yawns, etc.
  - 7. Talks to self
  - 8. Gestures
  - 9. Noncommunicating gestures
- F. Removes Clothes

IV. BEHAVIOR WITH OBJECTS:

- A. Gustatory Scanning - Puts things in the mouth
- B. Olfactory Scanning - Smelling objects
- C. Visual Scanning in General - Merely looking carefully about the room
- D. Visual Scanning Specifically - Looking carefully at a particular toy
- E. Tactual Scanning in General - Merely passing the hand over objects
- F. Explores Generally:
  - 1. Opens doors or tops of objects

CODE FOR INDIVIDUAL PROTOCOL (ACTIVITIES) - Continued

F. Explores Generally:

  2. Cursory pushing or moving of objects

  3. Investigation of inside of compartment without objects being visible; or looks without opening

  4. Closes door or tops of objects

  5. Attempts to open object, but stops

G. Explores Specifically - Examines individual parts of a specific object to see how things work

H. Inappropriate Mechanical Play - Beating walls with drum

I. Appropriate Mechanical Play - Beating the drum; scribbling on the blackboard, etc.

J. Classifying Behavior:

  1. Piling and placing objects together randomly

  2. Sorting objects into definite categories

  3. Arranging objects into definite patterns, but not necessarily groups

K. Dress Up Behavior

L. Setting Up Behavior:

  1. Setting Up - Putting car down on the floor getting ready to play; putting the pots randomly on the top of the stove in anticipating of playing, etc.

  2. Building

  3. Putting things together to complete a set - putting the hose on the fire engine

M. Pretending Behavior:

  1. Simple - No real attempt to structure situation systematically, i.e. flying airplanes, dressing dolls, etc.

  2. Complex - Making a plot out of the toys, i.e. playing house

  3. Person - Pretending that another person in there, or giving life to an inantimate object

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CODE FOR INDIVIDUAL PROTOCOL (ACTIVITIES) - Continued

M. Pretending Behavior:

   4. Other Object - Pretending that another object is something else

N. Symbolic Manipulation Behavior:

   1. Gesturing to another person
   2. Gaining attention tactually
   3. Verbal discourse
      a. Speech
      b. Non-intelligible vocalizations
      c. Distressful sounds
   4. Showing or demostrating
   5. Tactual comforting - Sitting in the lap of another person
   6. Writing
   7. Drawing

O. Problem Solving Behavior:

   1. Simple Comparison - Taking two objects and matching them to see if they are alike, etc.
   2. Trial and Error - Taking pieces or objects available and manipulating them with no thought or planning strategy
   3. Planning Behavior - Examination of the parts of the problem in an attempt to derive correct solution
   4. Problem Solving Automatic - Knows the correct solution to the problem; no real problem solving inolved, i.e. the puzzle box
   5. Avoidance of Problem - Avoids the problem, or gives up after making attempt; or just employs those pieces of the problem that can be readily dealt with

PERIOD
I-A
I-B
I-C
I-D
I-E
I-F-1
I-F-2
I-G
I-H
I-I
I-J
II-A
II-B
II-C
II-D
II-E
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III-D
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III-E-2
III-E-3
III-E-4
III-E-5
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III-E-8
III-E-9
III-F
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IV-M-1
IV-M-2
IV-M-3
IV-M-4
IV-N-1
IV-N-2
IV-N-3-a
IV-N-3-b
IV-N-3-c
IV-N-4
IV-N-5
IV-N-6
IV-N-7
IV-O-1
IV-O-2
IV-O-3
IV-O-4
IV-O-5

Name ______________________

Rater ______________________

Tape ______________________

APPENDIX D

OBJECT DIMENSION SCORING SHEET

CODE FOR EQUIPMENT AND OBJECTS

I. EQUIPMENT:

1. Mirror I
2. Mirror II
3. Ceiling
4. Walls
5. Bookcase
6. First Shelf
7. Second Shelf
8. Third Shelf
9. Door
10. Decals

II. OBJECTS:

1. Scales
2. Bed
3. Mattress
4. Doll Clothes
5. Black Doll
6. White Doll
7. Raggedy Ann
8. Raggedy Andy
9. Sasha
10. Gregor
11. Ironing Board
12. Iron
13. Chalk Board
14. Chalk
15. Eraser
16. Dutch Cabinet
17. Pots
18. Dishes
19. Kitchen Utensils
20. Refrigerator
21. Straw Hat
22. Fire Hat
23. Workman Hat
24. Cowboy Hat
25. Explorer Hat
26. Top Hat
27. Stove
28. Dust Mop
29. Janitor Mop
30. Carpet Sweeper
31. Wet Mop
32. Broom
33. Dust Pan
34. Dust Broom
35. Sink
36. Eating Utensils
37. Wooden Blocks
38. Foam Blocks
39. Chairs
40. Table
41. Toaster
42. Volkswagon
43. Dump Truck
44. Wrecker
45. Bulldozer
46. Crane
47. Puzzle Box
48. Cylinder
49. Triangle
50. Rectangle
51. Odd Piece
52. Cube
53. Cat Puzzle
54. Dog Puzzle
55. Stuffed Cat
56. Stuffed Rabbit
57. Stuffed Dog
58. Stuffed Bear
59. Drum
60. Self
61. Clothes
62. Other Person
63. Other
64. Puzzle
65. Fire Engine
66. Long thin Hose
67. Heavy Hydrant Hose
68. Hanger for Doll Clothes
69. Airplane - No Propeller
70. Airplane - Propeller
71. Helicopter
72. Pull Bee
73. Toast from Toaster
74. Drum stick
75. Pull Train
76. Chalk Box

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NAME: ____________________

RATER ____________________

DATE: ____________________

APPENDIX E

MEANS AND STANDARD DEVIATIONS FOR EACH SUBJECT FOR EACH ACTIVITY SUB-DIMENSION OVER THE THREE TIME PERIODS

Locomotion Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
1	0.63	1.73	0.07	0.26
2	0.23	0.50	0.56	1.11
3	0.20	0.75	0.25	0.58
4	0.40	0.65	0.41	0.95
5	0.60	1.31	0.49	1.18
6	0.49	0.94	0.27	0.52
7	0.38	0.93	0.52	1.27
8	0.43	1.11	0.72	1.49
9	0.58	1.18	0.29	1.21
10	0.41	0.73	0.98	1.81
11	0.60	1.14	0.58	1.25
12	0.27	0.59	0.54	0.93
13	0.81	1.70	1.00	1.77
14	0.72	1.48	0.52	1.16
15	0.74	1.29	0.72	1.11
16	0.61	1.09	0.67	1.21
17	0.45	1.08	0.58	1.22
18	0.58	1.81	0.65	1.29
19	0.52	1.24	0.56	1.16
20	0.36	0.67	0.76	1.64
21	0.58	1.25	0.43	1.16
22	0.54	1.19	0.65	1.41
23	0.65	1.23	0.38	0.84
24	0.74	1.46	0.25	0.61
25	0.74	1.84	0.70	1.62
26	0.05	0.29	0.38	0.75
27	0.23	0.79	0.03	0.18
28	0.30	0.69	0.49	0.87
29	0.61	1.28	0.36	0.64
30	0.40	0.99	0.25	0.67
31	0.27	0.70	0.54	2.12
32	0.54	1.35	0.67	1.79
33	0.47	0.99	0.40	0.85
34	0.72	1.99	0.74	1.32

APPENDIX E - Continued

Locomotion Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
35	0.36	1.00	0.49	1.00
36	1.45	6.13	0.29	0.59
37	0.61	0.91	0.09	0.29
38	0.38	0.84	1.01	1.35
39	0.60	0.87	0.63	1.06
40	0.92	1.43	0.67	1.07
41	0.70	1.28	0.89	1.54
42	0.65	1.26	0.40	0.78
43	0.54	1.15	0.54	1.01
44	0.50	0.94	0.81	1.41
45	0.78	1.44	0.41	1.25
46	0.85	1.55	0.94	1.36
47	0.30	0.69	0.74	1.20
48	1.01	1.72	1.12	1.84
49	0.52	1.15	0.70	1.32
50	1.60	2.40	1.14	1.67
51	1.03	1.80	0.87	1.61
52	0.60	1.29	0.76	1.49
53	0.50	1.13	1.05	1.66
54	0.56	1.01	0.80	1.74
55	1.07	1.81	0.89	1.88
56	1.10	1.48	0.87	1.73
57	1.21	1.65	0.81	1.54
58	1.16	2.58	0.89	1.57
59	0.14	0.48	0.61	1.16
60	0.63	1.72	0.29	0.62
61	0.41	0.76	1.12	2.05
62	0.78	1.57	0.70	2.75
63	0.60	1.09	0.09	0.44
64	0.30	0.63	0.29	0.85
65	0.80	1.91	0.76	1.13
66	0.98	1.71	0.58	0.93
67	1.40	2.86	0.32	0.77
68	0.61	1.13	1.25	2.52
69	0.16	0.42	1.07	2.36
70	0.61	1.02	0.36	0.67
71	1.14	1.79	0.98	1.54

Locomotion Dimension - 6 through 10 minute time period

1	0.40	0.95	0.30	0.76
2	0.21	0.56	0.29	0.78
3	0.38	1.19	0.25	0.86
4	0.38	0.91	0.54	1.31
5	0.38	0.95	0.50	1.18

APPENDIX E - Continued

Locomotion Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\overline{X}$	SD	$\overline{X}$	SD
6	0.21	0.76	0.83	2.00
7	0.36	1.16	0.65	1.40
8	0.25	0.86	0.61	1.40
9	0.50	1.01	0.21	0.71
10	0.52	1.10	0.60	1.11
11	0.60	1.19	0.58	1.27
12	0.12	0.51	0.52	1.16
13	0.67	1.37	0.52	1.31
14	0.05	0.22	0.09	0.29
15	0.50	1.10	0.09	0.29
16	0.54	1.15	0.34	0.82
17	0.30	0.95	0.43	0.91
18	0.38	0.95	0.43	1.44
19	0.61	1.56	0.38	0.78
20	0.92	1.07	0.32	0.81
21	0.38	1.23	0.54	1.16
22	0.49	1.19	0.38	0.99
23	0.87	1.40	0.36	0.94
24	0.58	1.64	0.56	1.13
25	0.20	0.64	0.58	1.28
26	0.10	0.45	0.43	1.01
27	0.18	0.38	0.20	0.55
28	0.25	0.64	0.56	1.31
29	0.60	1.31	0.52	1.19
30	0.38	1.02	0.05	0.29
31	0.78	2.01	0.23	0.90
32	0.61	1.38	0.23	0.90
33	0.85	2.04	0.36	1.07
34	0.38	1.09	0.47	1.13
35	0.34	1.18	0.47	0.92
36	0.38	1.44	0.29	0.83
37	0.29	0.59	0.56	1.06
38	0.54	1.05	0.70	1.57
39	0.60	1.24	0.76	1.13
40	0.29	0.56	0.61	1.25
41	0.49	1.23	1.00	2.02
42	0.45	1.18	0.60	1.25
43	0.30	0.74	1.12	2.04
44	0.70	1.21	1.05	1.72
45	0.14	0.77	0.81	1.61
46	0.60	1.43	0.18	0.47
47	0.41	1.04	0.98	1.47
48	1.18	1.97	1.07	1.77
49	0.78	1.28	0.76	1.78
50	0.89	1.38	0.40	0.87
51	0.92	1.33	0.20	0.52

APPENDIX E - Continued

Locomotion Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
52	0.09	0.29	0.47	1.11
53	1.07	1.75	1.05	1.75
54	0.65	1.43	0.56	1.06
55	1.27	2.04	1.07	1.84
56	0.67	1.44	0.65	1.41
57	0.76	1.42	0.34	1.18
58	0.56	1.27	0.43	0.91
59	0.52	1.11	0.87	1.58
60	0.21	0.59	0.69	1.62
61	0.72	1.19	0.12	0.57
62	0.58	1.38	0.90	1.53
63	1.07	1.77	0.69	1.86
64	0.74	1.55	0.67	1.38
65	1.05	1.89	0.40	0.80
66	0.78	1.61	0.78	1.34
67	0.14	0.52	0.72	1.33
68	1.07	1.80	0.09	0.44
69	0.85	1.60	0.34	1.07
70	0.30	0.69	0.85	1.31
71	0.31	1.15	0.69	1.26

Locomotion Dimension - 11 through 15 minute time period

1	0.09	0.39	0.25	0.61
2	0.09	0.29	0.00	0.00
3	0.34	1.12	0.09	0.34
4	0.30	0.85	0.12	0.51
5	0.52	1.35	0.30	0.71
6	0.45	0.78	0.38	0.78
7	0.25	0.86	0.25	0.64
8	0.00	0.00	0.01	0.13
9	0.45	0.85	0.00	0.00
10	0.85	2.04	0.29	0.71
11	0.54	1.03	0.30	0.63
12	0.00	0.00	0.43	0.93
13	0.27	0.87	0.16	0.53
14	0.00	0.00	0.23	0.42
15	0.09	0.29	0.32	0.57
16	0.56	1.13	0.20	0.44
17	1.56	4.77	0.03	0.18
18	0.05	0.40	0.00	0.00
19	0.00	0.00	0.00	0.00
20	0.12	0.57	0.23	0.42
21	0.45	1.05	0.03	0.18
22	0.28	0.80	0.50	1.37
23	0.60	1.22	0.25	0.82

APPENDIX E - Continued

Locomotion Dimension - 11 through 15 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
24	0.23	0.66	0.41	0.65
25	0.23	0.63	0.47	1.08
26	0.41	1.04	0.14	0.62
27	0.16	0.66	0.56	1.61
28	0.47	1.06	0.12	0.57
29	0.21	0.56	0.18	0.38
30	0.38	1.29	0.05	0.22
31	0.16	0.56	0.16	0.60
32	0.30	0.95	0.21	1.11
33	0.12	0.38	0.21	0.56
34	0.18	0.61	0.12	0.43
35	0.30	0.87	0.60	1.38
36	0.01	0.13	0.40	0.93
37	0.30	0.71	0.00	0.00
38	0.32	0.81	0.12	0.61
39	0.38	0.80	0.49	1.12
40	0.45	0.81	0.54	0.99
41	0.27	0.84	0.50	0.83
42	0.01	0.13	0.56	1.11
43	0.36	1.00	0.07	0.37
44	0.03	0.18	0.00	0.00
45	0.34	0.75	0.29	0.59
46	0.07	0.32	0.50	1.15
47	0.29	1.04	0.32	0.69
48	0.58	1.35	0.49	0.74
49	0.89	1.39	0.54	0.99
50	0.20	0.77	0.18	0.61
51	0.41	0.99	0.00	0.00
52	0.29	0.83	0.07	0.26
53	0.25	0.86	0.40	0.85
54	0.25	0.58	0.23	0.54
55	0.85	0.73	0.32	0.54
56	0.89	1.72	0.16	0.37
57	0.29	0.85	0.07	0.26
58	0.16	0.37	0.23	0.57
59	0.12	0.43	0.23	0.69
60	0.10	0.45	0.38	0.70
61	0.69	1.30	0.54	0.78
62	0.32	0.79	0.21	0.53
63	0.69	1.78	0.36	0.61
64	0.30	1.03	1.10	1.84
65	0.74	1.46	0.25	0.82
66	0.20	0.55	0.23	0.54
67	0.43	0.71	0.07	0.32
68	0.52	1.24	0.38	0.84
69	0.63	1.62	0.43	1.25

APPENDIX E - Continued

Locomotion Dimension - 10 through 15 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
70	0.34	0.82	0.29	0.59
71	0.87	1.15	1.00	1.26

Handling Dimension - 1 through 5 minute time period

1	0.46	0.86	0.37	1.59
2	0.13	0.40	1.24	2.12
3	0.68	1.50	1.48	3.42
4	0.42	0.86	1.48	3.23
5	0.57	1.69	1.13	1.75
6	1.51	3.41	0.97	1.87
7	0.00	0.00	0.40	0.78
8	0.71	1.35	0.91	2.07
9	0.48	1.03	0.55	1.07
10	1.17	1.65	0.35	0.67
11	0.20	0.62	0.53	1.15
12	1.02	1.63	0.86	1.42
13	0.28	0.81	0.40	0.91
14	2.44	5.20	0.48	1.30
15	0.84	1.62	1.71	2.82
16	0.24	0.64	0.57	1.07
17	1.33	2.19	0.86	1.25
18	0.93	1.51	0.40	0.75
19	1.37	2.72	0.88	1.43
20	1.86	2.77	1.48	2.62
21	1.13	1.72	1.31	2.18
22	1.28	1.97	0.26	0.91
23	0.91	1.53	0.33	0.97
24	1.62	2.16	0.73	1.23
25	1.31	2.44	0.75	1.36
26	0.20	0.75	1.06	1.93
27	0.97	2.00	0.53	1.32
28	1.40	2.75	0.86	1.32
29	1.35	2.46	0.53	1.01
30	1.04	1.97	0.17	0.71
31	1.33	2.17	1.60	2.26
32	0.93	2.12	1.15	2.13
33	1.80	2.80	0.37	0.91
34	1.15	1.84	0.44	0.78
35	1.68	2.06	0.66	1.47
36	0.53	1.27	0.55	1.13
37	0.33	0.90	0.15	0.67
38	0.84	1.69	0.42	0.89
39	0.44	0.84	0.15	0.56
40	0.66	1.39	0.55	1.21

APPENDIX E - Continued

Handling Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\overline{X}$	SD	$\overline{X}$	SD
41	0.77	1.24	0.33	1.06
42	0.22	0.95	0.31	1.29
43	0.80	1.87	0.11	0.38
44	0.75	1.52	0.24	0.67
45	1.17	2.51	0.37	1.02
46	0.46	0.91	0.06	0.44
47	0.66	1.29	0.00	0.00
48	0.42	1.49	0.08	0.46
49	0.24	0.64	0.44	1.37
50	0.35	1.26	0.13	0.50
51	0.22	0.73	0.24	0.60
52	0.35	1.06	0.24	0.74
53	0.06	0.33	0.31	0.99
54	0.11	0.43	0.40	1.15
55	0.40	1.05	0.31	0.79
56	0.11	0.38	0.11	0.74
57	0.42	1.15	0.28	0.72
58	0.13	0.54	0.11	0.48
59	0.00	0.00	0.22	1.06
60	0.37	1.05	0.73	1.57
61	0.82	1.70	0.17	0.61
62	0.40	1.15	0.42	1.09
63	0.44	1.19	0.06	0.33
64	0.37	0.86	0.40	1.07
65	0.31	0.94	0.20	0.62
66	0.57	1.43	0.40	1.13
67	0.48	1.03	0.04	0.29
68	0.66	1.26	0.42	1.15
69	0.40	1.26	0.37	1.17
70	0.20	0.58	0.08	0.48
71	0.38	1.22	0.13	0.62

Handling Dimension - 6 through 10 minute time period

1	0.80	1.47	0.04	0.29
2	0.33	0.85	0.84	1.50
3	0.53	1.05	0.64	1.20
4	0.64	1.09	0.84	1.33
5	0.22	0.51	1.35	2.76
6	0.68	1.39	0.57	1.03
7	0.04	0.20	1.11	2.13
8	1.68	3.26	0.57	1.07
9	0.24	0.60	2.40	4.06
10	0.95	1.74	0.28	0.69
11	0.31	1.36	0.80	1.45

APPENDIX E - Continued

Handling Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
12	1.00	1.70	0.51	0.96
13	0.66	1.39	0.33	0.85
14	0.86	1.36	1.37	2.72
15	1.26	2.13	0.66	1.10
16	0.62	1.02	0.64	1.15
17	0.31	0.82	1.11	1.46
18	1.06	1.64	0.75	1.19
19	1.97	3.88	0.20	0.58
20	1.13	2.62	0.13	0.34
21	1.20	2.38	0.35	0.67
22	1.22	1.71	1.42	2.44
23	1.13	2.10	0.91	2.26
24	0.71	1.76	0.86	1.37
25	1.57	3.17	1.04	1.55
26	0.00	0.00	0.84	2.83
27	0.54	0.99	1.08	1.72
28	1.51	2.60	0.71	1.14
29	1.37	1.82	1.02	1.76
30	1.51	2.18	0.80	1.32
31	0.73	1.13	2.33	3.43
32	0.44	1.11	1.20	1.89
33	1.60	2.79	1.42	2.60
34	2.24	3.62	0.53	1.23
35	1.46	3.07	1.13	1.57
36	0.77	1.45	0.93	1.33
37	0.62	1.17	0.02	0.14
38	0.95	2.19	1.33	1.78
39	0.73	1.15	0.62	1.17
40	0.26	0.53	0.88	1.43
41	0.93	1.30	1.55	2.04
42	0.11	0.31	0.80	1.51
43	1.44	2.44	0.82	1.48
44	0.22	0.55	0.57	1.05
45	0.84	1.29	1.75	2.99
46	0.31	1.18	0.20	0.50
47	0.93	1.65	0.57	0.86
48	0.75	1.59	0.37	0.96
49	0.33	0.52	0.95	1.83
50	1.22	2.08	0.48	1.05
51	0.84	1.41	0.68	1.08
52	0.24	0.67	0.84	1.20
53	1.97	3.52	0.91	1.23
54	0.80	1.77	1.17	1.52
55	1.15	2.38	0.22	0.59
56	0.93	1.86	0.13	0.40
57	0.68	1.42	0.37	0.80

APPENDIX E - Continued

Handling Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
58	1.23	2.03	1.77	1.68
59	0.00	0.00	0.71	1.61
60	0.80	1.47	0.80	1.39
61	0.88	1.97	1.62	2.04
62	1.40	2.16	0.33	0.90
63	1.08	1.44	1.02	1.38
64	0.73	1.17	0.46	0.94
65	0.31	0.73	0.71	1.07
66	1.33	2.37	1.08	2.09
67	1.77	2.53	0.73	1.00
68	1.37	2.44	2.17	2.97
69	0.88	1.51	1.11	2.05
70	1.08	1.70	0.68	1.16
71	1.48	1.74	1.55	4.40

Handling Dimension - 11 through 15 minute time period

1	0.22	0.95	0.06	0.25
2	0.11	0.31	0.80	1.75
3	0.20	0.66	0.28	0.99
4	0.33	0.90	0.80	2.39
5	1.24	1.49	0.28	0.62
6	0.88	1.46	0.84	1.39
7	0.00	0.00	0.11	0.43
8	0.22	0.59	0.08	0.28
9	0.22	0.70	1.35	2.26
10	0.37	1.31	0.33	1.27
11	0.26	0.61	0.37	0.88
12	0.57	0.89	0.15	0.36
13	0.00	0.00	0.02	0.14
14	0.66	1.26	0.26	0.61
15	0.00	0.00	0.84	2.20
16	0.00	0.00	0.40	0.88
17	3.51	12.93	0.13	0.40
18	0.26	0.68	0.28	0.62
19	0.22	0.63	1.84	3.87
20	0.93	1.49	1.55	2.66
21	0.28	0.69	0.28	1.25
22	0.91	1.67	0.11	0.43
23	0.60	1.46	0.42	0.75
24	0.02	0.14	0.82	1.07
25	0.26	0.44	0.22	0.67
26	1.91	3.89	0.40	1.07
27	0.84	2.29	0.35	0.64
28	0.31	0.73	0.17	0.38

APPENDIX E - Continued

Handling Dimension - 11 through 15 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
29	1.02	1.80	2.24	4.59
30	0.57	0.81	0.93	2.57
31	0.64	1.13	0.51	1.03
32	0.24	0.43	0.06	0.33
33	1.04	2.04	0.20	0.69
34	0.77	1.36	0.04	0.20
35	0.15	0.36	0.04	0.29
36	0.20	0.62	0.62	1.02
37	0.33	0.67	1.95	4.03
38	1.00	1.38	0.57	2.20
39	0.77	1.84	0.95	1.83
40	0.13	0.50	0.44	0.69
41	0.08	0.28	0.82	1.28
42	0.26	0.68	0.13	0.50
43	1.08	2.31	0.08	0.28
44	0.60	1.46	1.00	1.70
45	0.46	0.81	0.24	0.95
46	0.08	0.35	0.08	0.28
47	0.02	0.14	0.02	0.14
48	0.35	0.48	0.00	0.00
49	0.26	0.44	1.00	2.18
50	0.42	1.13	0.40	0.88
51	0.28	0.86	0.04	0.29
52	0.55	1.01	0.08	0.28
53	0.17	0.64	0.62	1.17
54	0.11	0.31	1.17	2.60
55	1.04	2.07	3.00	9.93
56	0.48	1.14	0.24	0.64
57	0.02	0.14	0.69	1.34
58	0.22	0.95	0.22	0.59
59	0.88	1.54	0.26	0.65
60	0.48	1.30	0.51	0.72
61	0.22	0.55	1.11	1.58
62	1.06	1.99	0.28	0.94
63	0.44	0.96	0.35	0.88
64	0.64	1.26	0.48	1.25
65	0.28	0.54	0.08	0.28
66	1.26	2.25	0.28	0.58
67	0.75	1.41	0.86	1.53
68	0.48	1.39	0.53	0.96
69	0.02	0.14	0.55	1.03
70	0.02	0.16	0.06	0.25
71	1.11	1.26	0.88	1.17

APPENDIX E - Continued

Behavior with Self Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
1	0.00	0.00	0.21	0.58
2	0.10	0.45	0.24	0.54
3	0.14	0.42	0.15	0.58
4	0.20	0.57	0.08	0.32
5	0.44	1.05	0.28	0.71
6	0.12	0.44	0.40	0.95
7	0.17	0.63	0.40	0.98
8	0.04	0.26	0.05	0.23
9	0.11	0.46	0.11	0.43
10	0.07	0.25	0.31	0.79
11	0.38	0.90	0.04	0.20
12	0.07	0.49	0.12	0.56
13	0.57	1.26	0.25	0.79
14	0.18	0.64	0.08	0.32
15	0.17	0.61	0.22	0.66
16	0.17	0.63	0.11	0.36
17	0.28	0.72	0.07	0.25
18	0.12	0.37	0.11	0.43
19	0.21	0.65	0.25	0.87
20	0.04	0.26	0.24	0.85
21	0.17	0.63	0.05	0.23
22	0.15	0.47	0.14	0.42
23	0.21	0.77	0.27	0.65
24	0.27	0.74	0.37	0.93
25	0.28	0.68	0.35	1.04
26	0.24	1.04	0.15	0.47
27	0.04	0.20	0.28	0.70
28	0.32	0.77	0.38	0.87
29	0.11	0.40	0.21	0.56
30	0.08	0.37	0.02	0.16
31	0.51	2.12	0.07	0.25
32	0.52	1.04	0.24	0.76
33	0.37	0.99	0.18	0.57
34	0.11	0.36	0.55	1.32
35	0.40	1.10	0.42	1.16
36	0.14	0.68	0.22	0.66
37	0.11	0.40	0.47	1.01
38	0.78	3.53	0.28	0.61
39	0.27	0.70	0.18	0.63
40	0.58	1.23	0.28	0.64
41	0.21	0.75	0.47	0.86
42	0.27	0.84	0.35	0.79
43	0.05	0.23	0.48	1.22
44	0.25	0.82	0.14	0.49
45	0.25	0.77	0.05	0.23

APPENDIX E - Continued

Behavior with Self Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
46	0.42	0.98	0.40	0.76
47	0.17	0.77	0.17	0.58
48	0.25	0.65	0.32	0.92
49	0.12	0.63	0.11	0.52
50	0.37	1.00	0.32	0.91
51	0.22	0.56	0.11	0.43
52	0.27	0.75	0.08	0.28
53	0.28	0.88	0.10	0.42
54	0.21	0.67	0.20	0.60
55	0.22	0.72	0.44	1.19
56	0.24	0.80	0.27	0.93
57	0.48	0.89	0.08	0.32
58	0.25	0.52	0.12	0.44
59	0.35	0.97	0.31	0.82
60	0.00	0.00	0.32	0.82
61	0.50	1.11	0.54	1.16
62	0.27	0.65	0.10	0.38
63	0.25	0.65	0.27	0.70
64	0.64	1.23	0.07	0.31
65	0.51	1.03	0.50	0.98
66	0.62	1.26	0.34	0.72
67	0.20	0.71	0.07	0.25
68	0.34	0.84	0.17	0.56
69	0.14	0.68	0.27	0.91
70	0.07	0.25	0.14	0.45
71	0.64	1.50	0.51	1.09

Behavior with Self Dimension - 6 through 10 minute time period

1	0.01	0.11	0.14	0.57
2	0.10	0.42	0.28	0.83
3	0.10	0.34	0.08	0.28
4	0.05	0.23	0.10	0.42
5	0.37	0.80	0.11	0.40
6	0.05	0.28	0.22	0.74
7	0.37	1.00	0.17	0.56
8	0.08	0.32	0.15	0.47
9	0.12	0.37	0.14	0.57
10	0.11	0.40	0.32	0.69
11	0.21	0.75	0.07	0.25
12	0.14	0.59	0.02	0.16
13	0.25	0.62	0.28	0.78
14	0.04	0.20	0.20	0.65
15	0.44	1.03	0.14	0.45

APPENDIX E - Continued

Behavior with Self Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
16	0.28	0.91	0.14	0.51
17	0.00	0.00	0.11	0.43
18	0.02	0.16	0.10	0.44
19	0.15	0.58	0.04	0.20
20	0.07	0.25	0.02	0.16
21	0.21	0.56	0.08	0.32
22	0.05	0.28	0.17	0.58
23	0.05	0.23	0.37	0.87
24	0.15	0.52	0.32	0.92
25	0.08	0.28	0.21	0.61
26	0.22	0.83	0.27	0.79
27	0.24	0.85	0.37	0.80
28	0.21	0.56	0.14	0.57
29	0.34	0.88	0.31	0.90
30	0.14	0.64	0.10	0.34
31	0.20	0.65	0.12	0.70
32	0.48	1.04	0.34	0.89
33	0.30	0.66	0.30	0.84
34	0.54	1.15	0.40	1.02
35	0.41	1.02	0.35	1.07
36	0.32	0.97	0.00	0.00
37	0.18	0.45	0.05	0.28
38	0.08	0.28	0.11	0.55
39	0.07	0.31	0.07	0.35
40	0.21	0.61	0.00	0.00
41	0.38	0.87	0.10	0.38
42	0.22	0.85	0.01	0.11
43	0.50	1.13	0.01	0.11
44	0.14	0.49	0.08	0.53
45	0.22	0.65	0.00	0.00
46	0.14	0.76	0.14	0.59
47	0.20	0.65	0.05	0.37
48	0.20	0.55	0.34	1.26
49	0.20	0.52	0.58	1.70
50	0.21	0.67	0.07	0.39
51	0.05	0.23	0.02	0.16
52	0.00	0.00	0.01	0.11
53	0.00	0.00	0.01	0.11
54	0.00	0.00	0.14	0.62
55	0.00	0.00	0.42	1.50
56	0.08	0.71	0.04	0.20
57	0.04	0.35	0.00	0.00
58	0.04	0.35	0.00	0.00
59	0.05	0.37	0.02	0.16
60	0.00	0.00	0.00	0.00

APPENDIX E - Continued

Behavior with Self Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
61	0.02	0.16	0.00	0.00
62	0.07	0.39	0.00	0.00
63	0.00	0.00	0.04	0.26
64	0.00	0.00	0.02	0.23
65	0.00	0.00	0.14	0.76
66	0.11	0.55	0.21	0.96
67	0.00	0.00	0.18	0.82
68	0.02	0.16	0.15	0.79
69	0.01	0.11	0.10	0.51
70	0.04	0.26	0.00	0.00
71	0.05	0.28	0.00	0.00

Behavior with Self Dimension - 10 through 15 minute time period

1	0.02	0.23	0.21	0.63
2	0.07	0.25	0.15	0.52
3	0.05	0.23	0.08	0.37
4	0.02	0.16	0.00	0.00
5	0.05	0.33	0.00	0.00
6	0.00	0.00	0.01	0.11
7	0.14	0.51	0.24	0.54
8	0.05	0.23	0.04	0.20
9	0.05	0.28	0.05	0.23
10	0.04	0.20	0.30	0.66
11	0.01	0.11	0.08	0.37
12	0.02	0.23	0.17	0.50
13	0.00	0.00	0.04	0.26
14	0.07	0.25	0.22	0.64
15	0.00	0.00	0.32	1.07
16	0.07	0.59	0.15	0.65
17	0.17	0.50	0.01	0.11
18	0.02	0.23	0.00	0.00
19	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00
21	0.05	0.28	0.12	0.47
22	0.05	0.23	0.02	0.23
24	0.15	0.50	0.11	0.32
25	0.17	0.53	0.18	0.54
26	0.14	0.39	0.28	0.74
27	0.27	0.47	0.10	0.34
28	0.22	0.61	0.14	0.54
29	0.14	0.42	0.14	0.42
30	0.07	0.25	0.17	0.56
31	0.07	0.25	0.25	0.55

APPENDIX E - Continued

Behavior with Self Dimension - 10 through 15 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
32	0.07	0.25	0.25	0.55
33	0.24	0.46	0.12	0.37
34	0.05	0.23	0.07	0.31
35	0.18	0.57	0.12	0.53
36	0.14	0.42	0.22	0.72
37	0.12	0.33	0.20	0.62
38	0.07	0.25	0.34	0.94
39	0.05	0.28	0.08	0.50
40	0.14	0.45	0.15	0.52
41	0.08	0.28	0.02	0.23
42	0.24	0.84	0.02	0.16
43	0.07	0.25	0.01	0.11
44	0.05	0.02	0.14	0.45
45	0.00	0.00	0.04	0.89
46	0.00	0.00	0.07	0.35
47	0.07	0.42	0.05	0.23
48	0.00	0.00	0.24	0.54
49	0.21	0.79	0.40	0.78
50	0.54	1.20	0.14	0.45
51	0.30	0.78	0.24	0.64
52	0.14	0.39	0.31	1.07
53	0.03	0.16	0.10	0.61
54	0.02	0.23	0.00	0.00
55	0.04	0.20	0.00	0.00
56	0.10	0.34	0.08	0.44
57	0.18	0.51	0.04	0.20
58	0.10	0.45	0.01	0.11
59	0.18	0.51	0.17	0.65
60	0.10	0.45	0.04	0.35
61	0.17	0.50	0.11	0.32
62	0.07	0.35	0.22	0.56
63	0.11	0.49	0.48	0.89
64	0.18	0.49	0.21	0.58
65	0.18	0.42	0.20	0.73
66	0.05	0.23	0.21	0.50
67	0.10	0.54	0.17	0.41
68	0.51	0.98	0.25	0.60
69	0.17	0.44	0.34	0.77
70	0.24	0.84	0.08	0.44
71	0.20	0.62	0.14	0.39

APPENDIX E - Continued

Behavior with Objects Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
1	0.18	0.63	0.20	0.89
2	0.21	0.60	0.26	0.91
3	0.28	0.75	0.28	0.93
4	0.31	0.92	0.27	0.76
5	0.25	0.77	0.33	0.95
6	0.31	0.74	0.21	0.71
7	0.24	0.74	0.23	0.76
8	0.30	1.10	0.24	0.77
9	0.65	2.63	0.28	0.96
10	0.25	0.72	0.31	0.79
11	0.21	0.78	0.30	0.89
12	0.24	0.82	0.24	0.83
13	0.10	0.43	0.34	0.95
14	0.27	0.89	0.35	0.97
15	0.30	0.96	0.25	0.74
16	0.27	0.79	0.25	0.68
17	0.15	0.65	0.28	0.79
18	0.31	0.83	0.30	0.92
19	0.30	1.23	0.24	0.77
20	0.41	1.04	0.24	0.80
21	0.25	0.78	0.36	1.08
22	0.25	0.75	0.30	0.78
23	0.28	0.85	0.38	0.92
24	0.27	0.83	0.23	0.66
25	0.28	0.90	0.41	1.19
26	0.35	1.22	0.26	1.11
27	0.20	0.60	0.37	1.27
28	0.20	0.66	0.31	1.15
29	0.28	0.85	0.30	0.86
30	0.23	0.84	0.26	0.78
31	0.42	1.40	0.27	0.96
32	0.32	0.99	0.24	0.77
33	0.31	1.00	0.38	1.14
34	0.34	1.07	0.51	1.30
35	0.32	0.97	0.38	1.39
36	0.30	0.91	0.30	0.89
37	0.30	0.74	0.20	0.85
38	0.35	0.89	0.55	1.21
39	0.35	1.02	0.37	1.02
40	0.30	0.83	0.38	1.14
41	0.42	1.02	0.43	1.10
42	0.37	1.02	0.26	0.84
43	0.37	1.10	0.32	1.00
44	0.29	0.96	0.29	1.02
45	0.47	1.54	0.28	0.96

APPENDIX E - Continued

Behavior with Objects Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
46	0.41	1.18	0.44	1.11
47	0.30	0.98	0.35	1.05
48	0.45	1.35	0.42	1.20
49	0.34	0.97	0.37	0.97
50	0.43	1.26	0.46	1.08
51	0.44	1.19	0.37	1.03
52	0.22	0.81	0.33	0.93
53	0.20	0.88	0.37	1.09
54	0.37	0.94	0.38	1.14
55	0.37	0.11	0.27	0.93
56	0.55	1.22	0.27	0.91
57	0.35	0.88	0.31	1.00
58	0.43	1.32	0.30	0.92
59	0.18	0.88	0.27	0.88
60	0.18	0.63	0.23	0.90
61	0.28	0.99	0.36	0.17
62	0.34	1.11	0.21	0.76
63	0.32	1.05	0.20	0.70
64	0.36	1.09	0.23	0.82
65	0.37	1.15	0.25	0.83
66	0.47	1.24	0.37	1.13
67	0.47	1.34	0.18	0.73
68	0.29	1.09	0.24	0.89
69	0.18	0.69	0.46	1.34
70	0.42	1.08	0.24	0.67
71	0.37	1.04	0.31	0.99

Behavior with Objects Dimension - 6 through 10 minute time period

1	0.23	0.74	0.16	0.80
2	0.18	0.70	0.23	0.72
3	0.21	0.60	0.35	1.18
4	0.31	1.02	0.26	0.79
5	0.28	0.86	0.31	1.03
6	0.36	1.18	0.31	0.96
7	0.12	0.63	0.19	0.66
8	0.28	0.73	0.21	0.70
9	0.26	0.72	0.21	0.74
10	0.22	0.83	0.20	0.63
11	0.21	0.62	0.28	0.70
12	0.25	0.83	0.31	1.27
13	0.21	0.78	0.20	0.63
14	0.51	1.45	0.23	0.75
15	0.24	0.71	0.24	0.83

APPENDIX E - Continued

Behavior with Objects Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
16	0.22	0.81	0.26	0.67
17	0.27	0.90	0.29	0.80
18	0.26	0.77	0.28	0.93
19	0.68	4.40	0.26	0.76
20	0.40	1.23	0.26	0.76
21	0.30	0.86	0.21	0.78
22	0.28	0.67	0.29	1.03
23	0.32	0.86	0.22	0.91
24	0.27	0.79	0.24	0.83
25	0.35	0.94	0.23	0.81
26	0.24	1.05	0.28	1.10
27	0.24	0.73	0.19	0.74
28	0.30	1.02	0.18	0.66
29	0.34	0.96	0.23	0.65
30	0.23	0.83	0.27	1.10
31	0.30	0.81	0.36	1.23
32	0.30	0.91	0.37	1.09
33	0.35	0.94	0.33	1.04
34	0.26	0.78	0.25	0.91
35	0.34	1.14	0.27	0.95
36	0.36	1.00	0.34	0.98
37	0.29	0.91	0.24	0.97
38	0.27	0.84	0.34	0.83
39	0.25	0.77	0.29	0.83
40	0.31	0.92	0.52	1.40
41	0.31	0.94	0.26	0.86
42	0.16	0.78	0.38	1.28
43	0.36	1.00	0.40	1.19
44	0.48	1.28	0.30	0.99
45	0.51	1.17	0.21	0.69
46	0.51	1.50	0.25	0.81
47	0.27	0.90	0.36	1.14
48	0.38	1.21	0.29	1.07
49	0.42	1.34	0.36	1.11
50	0.40	1.09	0.40	1.25
51	0.28	0.80	0.23	0.67
52	0.20	0.77	0.28	0.93
53	0.27	1.01	0.33	1.04
54	0.34	1.30	0.42	1.19
55	0.32	0.99	0.30	0.91
56	0.46	1.32	0.40	1.22
57	0.30	0.99	0.21	0.69
58	0.31	0.92	0.25	0.90
59	0.18	0.83	0.27	1.03
60	0.23	0.74	0.23	0.95
61	0.24	0.88	0.27	0.88

APPENDIX E - Continued

Behavior with Objects Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
62	0.36	1.03	0.34	1.22
63	0.25	0.89	0.17	0.76
64	0.37	1.14	0.26	0.76
65	0.36	1.07	0.27	0.85
66	0.43	1.20	0.36	1.02
67	0.37	1.19	0.13	0.70
68	0.20	0.73	0.17	0.66
69	0.31	1.00	0.32	1.06
70	0.42	1.19	0.28	0.82
71	0.19	0.85	0.23	0.83

Behavior with Objects Dimension - 10 through 15 minute time period

1	0.10	0.39	0.15	0.68
2	0.05	0.22	0.15	0.70
3	0.18	0.72	0.14	0.59
4	0.15	0.58	0.21	0.74
5	0.15	0.72	0.15	0.58
6	0.15	0.58	0.13	0.47
7	0.07	0.45	0.02	0.16
8	0.15	0.53	0.02	0.16
9	0.10	0.34	0.10	0.50
10	0.10	0.45	0.07	0.27
11	0.17	0.51	0.10	0.49
12	0.17	0.66	0.13	0.52
13	0.15	0.67	0.05	0.22
14	0.18	0.50	0.23	0.58
15	0.02	0.16	0.10	0.47
16	0.13	0.51	0.10	0.46
17	0.23	0.66	0.02	0.16
18	0.07	0.32	0.21	0.61
19	0.23	0.84	0.44	1.37
20	0.10	0.39	0.15	0.52
21	0.16	0.58	0.22	0.89
22	0.16	0.54	0.31	1.05
23	0.18	0.70	0.09	0.37
24	0.16	0.48	0.08	0.38
25	0.16	0.46	0.31	0.69
26	0.14	0.46	0.12	0.47
27	0.06	0.35	0.16	0.53
28	0.24	0.66	0.13	0.48
29	0.10	0.45	0.24	0.85
30	0.20	0.66	0.52	1.93
31	0.16	0.58	0.16	0.60
32	0.10	0.44	0.16	0.72

APPENDIX E - Continued

Behavior with Objects Dimension - 10 through 15 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
33	0.17	0.54	0.10	0.38
34	0.17	0.48	0.15	0.52
35	0.05	0.22	0.20	0.86
36	0.25	0.86	0.16	0.80
37	0.16	0.59	0.10	0.50
38	0.05	0.22	0.09	0.40
39	0.16	0.77	0.20	0.59
40	0.15	0.70	0.13	0.40
41	0.17	0.69	0.20	0.76
42	0.23	0.66	0.08	0.44
43	0.06	0.39	0.05	0.22
44	0.23	2.18	0.13	0.52
45	0.11	0.49	0.18	0.60
46	0.31	0.83	0.26	0.85
47	0.17	0.62	0.02	0.16
48	0.20	0.64	0.28	0.72
49	0.36	1.26	0.28	0.66
50	0.23	0.95	0.09	0.34
51	0.28	0.91	0.05	0.22
52	0.21	0.57	0.15	0.54
53	0.26	0.69	0.21	0.77
54	0.26	0.81	0.21	0.79
55	0.23	0.65	0.18	0.67
56	0.14	0.49	0.22	0.67
57	0.27	0.93	0.07	0.47
58	0.26	0.86	0.26	0.85
59	0.10	0.49	0.08	0.37
60	0.18	0.79	0.12	0.51
61	0.10	0.39	0.18	0.85
62	0.12	0.62	0.11	0.56
63	0.22	0.65	0.21	0.73
64	0.08	0.43	0.28	1.06
65	0.18	0.82	0.12	0.41
66	0.15	0.72	0.12	0.43
67	0.31	0.86	0.10	0.50
68	0.02	0.16	0.16	0.54
69	0.15	0.65	0.13	0.61
70	0.14	0.66	0.10	0.38
71	0.18	1.00	0.28	0.79

APPENDIX F

RESULTS OF A DISCRIMINATE ANALYSIS ON THE ACTIVITY DIMENSION SCORING DATA FOR THE TWO GROUPS OF SUBJECTS

Hearing Impaired

Case	1	2	Largest Probability
1	0.33	0.66	2
2	0.45	0.54	2
3	0.34	0.65	2
4	0.43	0.56	2
5	0.57	0.42	1
6	0.70	0.29	1
7	0.47	0.52	2
8	0.42	0.57	2
9	0.42	0.57	2
10	0.62	0.37	1
11	0.66	0.33	1
12	0.72	0.27	1
13	0.53	0.46	1
14	0.52	0.47	1
15	0.58	0.41	1
16	0.54	0.45	1
17	0.59	0.40	1
18	0.69	0.30	1
19	0.63	0.36	1
20	0.18	0.81	2
21	0.66	0.33	1
22	0.65	0.34	1
23	0.21	0.78	2
24	0.58	0.41	1
25	0.68	0.31	1
26	0.76	0.23	1
27	0.58	0.41	1
28	0.57	0.42	1
29	0.72	0.27	1
30	0.62	0.37	1
31	0.67	0.32	1
32	0.59	0.40	1
33	0.50	0.49	1
34	0.70	0.29	1
35	0.49	0.50	2
36	0.59	0.40	1
37	0.60	0.39	1
38	0.37	0.62	2
39	0.54	0.45	1

APPENDIX F - Continued

Hearing Impaired

Case	1	2	Largest Probability
40	0.60	0.39	1
41	0.60	0.39	1
42	0.47	0.52	2
43	0.46	0.53	2
44	0.47	0.52	2
45	0.38	0.61	2
46	0.46	0.53	2
47	0.42	0.57	2
48	0.60	0.39	1
49	0.43	0.56	2
50	0.50	0.49	1
51	0.57	0.42	1
52	0.59	0.40	1
53	0.52	0.47	1
54	0.47	0.52	2
55	0.53	0.46	1
56	0.54	0.45	1
57	0.48	0.51	2
58	0.50	0.49	1
59	0.54	0.45	1
60	0.49	0.50	2
61	0.52	0.47	1
62	0.52	0.47	1
63	0.44	0.55	2
64	0.57	0.42	1
65	0.54	0.45	1
66	0.62	0.37	1
67	0.54	0.45	1
68	0.55	0.44	1
69	0.51	0.48	1
70	0.57	0.42	1
71	0.48	0.51	2

Normally Hearing

Case	1	2	Largest Probability
72	0.43	0.56	2
73	0.47	0.52	2
74	0.57	0.42	1
75	0.49	0.50	2
76	0.69	0.30	1
77	0.17	0.82	2
78	0.56	0.43	1
79	0.27	0.72	2
80	0.37	0.62	2
81	0.36	0.63	2

APPENDIX F - Continued

Normally Hearing

Case	1	2	Largest Probability
82	0.54	0.45	1
83	0.58	0.41	1
84	0.71	0.28	1
85	0.42	0.57	2
86	0.48	0.51	2
87	0.47	0.52	2
88	0.21	0.78	2
89	0.32	0.67	2
90	0.50	0.49	1
91	0.12	0.87	2
92	0.08	0.91	1
93	0.49	0.50	2
94	0.56	0.43	1
95	0.28	0.71	2
96	0.44	0.55	2
97	0.46	0.53	2
98	0.24	0.75	2
99	0.44	0.55	2
100	0.72	0.27	1
101	0.36	0.63	2
102	0.10	0.89	2
103	0.30	0.69	2
104	0.74	0.25	1
105	0.65	0.34	1
106	0.17	0.82	2
107	0.69	0.30	1
108	0.61	0.38	1
109	0.53	0.46	1
110	0.50	0.49	1
111	0.50	0.49	1
112	0.50	0.49	1
113	0.64	0.35	1
114	0.55	0.44	1
115	0.44	0.55	2
116	0.58	0.41	1
117	0.50	0.49	1
118	0.52	0.47	1
119	0.48	0.51	2
120	0.52	0.47	1
121	0.44	0.55	2
122	0.53	0.46	1
123	0.39	0.60	2
124	0.44	0.55	2
125	0.49	0.50	2
126	0.48	0.51	2
127	0.42	0.57	2
128	0.49	0.50	2
129	0.46	0.53	2

APPENDIX F - Continued

Normally Hearing

Case	1	2	Largest Probability
130	0.40	0.59	2
131	0.51	0.48	1
132	0.56	0.43	1
133	0.49	0.50	2
134	0.50	0.49	1
135	0.51	0.48	1
136	0.43	0.56	2
137	0.49	0.50	2
138	0.52	0.47	1
139	0.47	0.52	2
140	0.49	0.50	2
141	0.54	0.45	1
142	0.45	0.54	2

APPENDIX G

CUMULATIVE PERCENTAGE SCORES OF FACTORS DERIVED FROM THE ACTIVITY DIMENSION SCORING PROCEDURE FOR BOTH GROUPS OF SUBJECTS

Factor	Cumulative Percentage Score
1	0.09
2	0.15
3	0.21
4	0.26
5	0.30
6	0.34
7	0.38
8	0.41
9	0.44
10	0.46
11	0.49
12	0.51
13	0.54
14	0.56
15	0.58
16	0.60
17	0.62
18	0.64
19	0.66
20	0.67
21	0.69
22	0.71
23	0.72
24	0.74
25	0.75
26	0.76
27	0.78
28	0.79
29	0.80
30	0.81
31	0.82
32	0.83
33	0.84
34	0.85
35	0.86
36	0.87
37	0.881
38	0.889
39	0.89
40	0.90
41	0.910
42	0.916
43	0.922
44	0.928
45	0.933

APPENDIX G - Continued

Factor	Cumulative Percentage Score
46	0.938
47	0.944
48	0.948
49	0.952
50	0.956
51	0.960
52	0.963
53	0.967
54	0.970
55	0.973
56	0.976
57	0.979
58	0.981
59	0.983
60	0.986
61	0.988
62	0.989
63	0.991
64	0.992
65	0.993
66	0.995
67	0.996
68	0.9971
69	0.9979
70	0.9986
71	0.9991
72	0.9996
73	0.9999

APPENDIX H

TOTAL NUMBER OF PICK UP AND PUT DOWN BEHAVIORS FOR BOTH GROUPS OF SUBJECTS OVER FIFTEEN MINUTES

	Hearing Impaired		Normally Hearing	
Minute	Pick Up	Put Down	Pick Up	Put Down
1	121	112	133	129
2	116	115	126	124
3	115	116	120	116
4	110	103	112	110
5	105	104	110	102
6	106	101	108	96
7	108	98	106	87
8	103	106	97	82
9	102	100	98	72
10	98	101	87	67
11	67	71	52	38
12	56	52	54	28
13	54	50	56	36
14	57	59	49	21
15	53	55	58	22

APPENDIX I

MEANS AND STANDARD DEVIATIONS FOR EACH SUBJECT FOR THE OBJECT DIMENSION OVER THE THREE TIME PERIODS

Object Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
1	0.17	0.58	0.10	0.55
2	0.07	0.54	0.07	0.39
3	0.10	0.49	0.10	0.35
4	0.16	0.56	0.14	0.48
5	0.12	0.51	0.15	0.64
6	0.09	0.51	0.10	0.51
7	0.10	0.53	0.13	0.49
8	0.11	0.50	0.12	0.49
9	0.11	0.46	0.17	0.60
10	0.10	0.46	0.10	0.42
11	0.19	0.65	0.12	0.50
12	0.10	0.55	0.15	0.56
13	0.07	0.31	0.17	0.56
14	0.16	0.66	0.11	0.49
15	0.09	0.43	0.03	0.25
16	0.09	0.38	0.12	0.48
17	0.21	0.68	0.46	0.37
18	0.06	0.34	0.12	0.47
19	0.10	0.43	0.15	0.59
20	0.13	0.62	0.14	0.52
21	0.11	0.51	0.13	0.46
22	0.13	0.64	0.04	0.35
23	0.06	0.40	0.80	0.40
24	0.19	0.92	0.07	0.40
25	0.17	0.70	0.13	0.50
26	0.23	0.68	0.16	0.60
27	0.08	0.49	0.05	0.45
28	0.20	0.73	0.10	0.46
29	0.12	0.55	0.13	0.55
30	0.09	0.40	0.15	0.64
31	0.09	0.53	0.10	0.50
32	0.08	0.48	0.15	0.60
33	0.14	0.55	0.13	0.58
34	0.09	0.46	0.11	0.65
35	0.12	0.44	0.15	0.67
36	0.03	0.31	0.06	0.49
37	0.11	0.49	0.12	0.53
38	0.13	0.64	0.03	0.24

APPENDIX I - Continued

Object Dimension - 1 through 5 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
39	0.06	0.40	0.11	0.46
40	0.19	0.92	0.06	0.47
41	0.17	0.70	0.13	0.57
42	0.16	0.71	0.11	0.48
43	0.10	0.47	0.14	0.49
44	0.17	0.65	0.13	0.47
45	0.23	0.68	0.04	0.37
46	0.08	0.49	0.03	0.23
47	0.20	0.73	0.06	0.39
48	0.12	0.55	0.11	0.45
49	0.09	0.40	0.15	0.60
50	0.09	0.53	0.01	0.19
51	0.08	0.48	0.09	0.44
52	0.14	0.55	0.11	0.47
53	0.09	0.46	0.14	0.64
54	0.12	0.44	0.08	0.44
55	0.03	0.31	0.14	0.57
56	0.11	0.49	0.13	0.59
57	0.12	0.44	0.09	0.59
58	0.03	0.31	0.13	0.40
59	0.11	0.49	0.06	0.47
60	0.12	0.45	0.10	0.50
61	0.09	0.40	0.33	0.44
62	0.08	0.47	0.49	0.56
63	0.08	0.48	0.13	0.54
64	0.09	0.41	0.11	0.55
65	0.12	0.49	0.14	0.61
66	0.10	0.48	0.09	0.44
67	0.16	0.55	0.16	0.61
68	0.09	0.40	0.22	0.66
69	0.14	0.53	0.08	0.47
70	0.12	0.53	0.15	0.65
71	0.11	0.53	0.10	0.41

Object Dimension - 5 through 10 minute time period

1	0.17	0.73	0.11	0.59
2	0.13	0.70	0.05	0.38
3	0.10	0.57	0.09	0.40
4	0.14	0.58	0.20	0.75
5	0.12	0.58	0.11	0.61
6	0.14	0.58	0.13	0.61
7	0.08	0.43	0.05	0.33
8	0.14	0.66	0.17	0.66

APPENDIX I - Continued

Object Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\bar{X}$	SD	$\bar{X}$	SD
9	0.14	0.61	0.09	0.56
10	0.17	0.60	0.06	0.47
11	0.16	0.61	0.13	0.57
12	0.13	0.49	0.12	0.51
13	0.01	0.21	0.05	0.30
14	0.20	0.74	0.01	0.17
15	0.09	0.41	0.36	0.38
16	0.10	0.53	0.10	0.48
17	0.24	0.82	0.12	0.64
18	0.07	0.41	0.18	0.71
19	0.11	0.49	0.12	0.52
20	0.11	0.55	0.18	0.66
21	0.11	0.54	0.06	0.34
22	0.17	0.62	0.13	0.61
23	0.06	0.48	0.08	0.49
24	0.16	0.60	0.06	0.46
25	0.10	0.55	0.18	0.56
26	0.16	0.58	0.14	0.59
27	0.09	0.40	0.06	0.47
28	0.19	0.64	0.06	0.39
29	0.17	0.65	0.04	0.34
30	0.12	0.55	0.15	0.69
31	0.10	0.51	0.03	0.24
32	0.10	0.47	0.14	0.66
33	0.06	0.36	0.12	0.59
34	0.12	0.55	0.05	0.37
35	0.10	0.48	0.11	0.52
36	0.13	0.62	0.06	0.46
37	0.06	0.47	0.01	0.17
38	0.13	0.51	0.16	0.70
39	0.07	0.49	0.10	0.46
40	0.09	0.59	0.14	0.70
41	0.12	0.50	0.17	0.65
42	0.10	0.49	0.06	0.29
43	0.12	0.55	0.14	0.56
44	0.06	0.43	0.04	0.26
45	0.08	0.46	0.01	0.15
46	0.15	0.70	0.02	0.25
47	0.12	0.52	0.08	0.47
48	0.11	0.51	0.11	0.48
49	0.11	0.41	0.03	0.20
50	0.00	0.00	0.01	0.10
51	0.11	0.51	0.06	0.39
52	0.06	0.32	0.22	0.74
53	0.08	0.44	0.02	0.23
54	0.17	0.64	0.02	0.20
55	0.04	0.32	0.10	0.54

APPENDIX I - Continued

Object Dimension - 6 through 10 minute time period

Pair	Hearing Impaired		Normally Hearing	
	$\overline{X}$	SD	$\overline{X}$	SD
56	0.06	0.39	0.05	0.35
57	0.08	0.49	0.03	0.27
58	0.10	0.57	0.02	0.22
59	0.06	0.34	0.06	0.46
60	0.06	0.32	0.13	0.61
61	0.23	0.92	0.04	0.29
62	0.09	0.57	0.08	0.52
63	0.11	0.61	0.14	0.53
64	0.04	0.30	0.10	0.52
65	0.15	0.60	0.12	0.55
66	0.07	0.50	0.16	0.54
67	0.06	0.50	0.11	0.50
68	0.12	0.56	0.18	0.67
69	0.10	0.48	0.12	0.58
70	0.05	0.32	0.14	0.60
71	0.13	0.57	0.03	0.19

Object Dimension - 11 through 15 minute time period

1	0.09	0.36	0.02	0.24
2	0.07	0.45	0.01	0.21
3	0.01	0.19	0.00	0.00
4	0.00	0.15	0.00	0.00
5	0.04	0.30	0.08	0.47
6	0.03	0.22	0.00	0.09
7	0.06	0.35	0.00	0.00
8	0.03	0.25	0.00	0.07
9	0.02	0.30	0.01	0.22
10	0.06	0.36	0.04	0.31
11	0.00	0.11	0.08	0.35
12	0.15	0.53	0.00	0.07
13	0.00	0.00	0.00	0.00
14	0.05	0.38	0.00	0.00
15	0.00	0.10	0.08	0.43
16	0.03	0.32	0.00	0.00
17	0.05	0.33	0.01	0.22
18	0.02	0.23	0.11	0.36
19	0.00	0.00	0.04	0.33
20	0.02	0.24	0.04	0.31
21	0.06	0.34	0.10	0.43
22	0.08	0.41	0.05	0.36
23	0.15	0.51	0.03	0.23
24	0.04	0.28	0.04	0.30
25	0.02	0.23	0.03	0.39
26	0.05	0.36	0.11	0.50
27	0.04	0.24	0.04	0.27

APPENDIX I - Continued

Object Dimension - 11 through 15 minute time period

Pair	Hearing Impaired		Normally Hearing	
	X	SD	X	SD
28	0.02	0.23	0.10	0.43
29	0.05	0.36	0.00	0.07
30	0.04	0.24	0.02	0.30
31	0.03	0.23	0.04	0.29
32	0.00	0.00	0.06	0.33
33	0.10	0.46	0.00	0.05
34	0.03	0.31	0.06	0.38
35	0.05	0.36	0.06	0.35
36	0.00	0.00	0.08	0.41
37	0.03	0.28	0.06	0.35
38	0.06	0.34	0.08	0.53
39	0.07	0.36	0.00	0.00
40	0.01	0.22	0.10	0.54
41	0.00	0.10	0.02	0.25
42	0.05	0.32	0.01	0.22
43	0.05	0.28	0.12	0.42
44	0.10	0.40	0.05	0.31
45	0.07	0.37	0.11	0.36
46	0.01	0.39	0.06	0.36
47	0.04	0.28	0.04	0.31
48	0.00	0.11	0.09	0.40
49	0.12	0.52	0.00	0.05
50	0.00	0.00	0.07	0.29
51	0.06	0.37	0.00	0.11
52	0.00	0.07	0.04	0.31
53	0.02	0.25	0.04	0.31
54	0.04	0.30	0.01	0.24
55	0.00	0.07	0.02	0.20
56	0.00	0.09	0.00	0.00
57	0.02	0.25	0.09	0.44
58	0.01	0.17	0.01	0.26
59	0.00	0.15	0.06	0.37
60	0.00	0.00	0.00	0.00
61	0.00	0.00	0.03	0.28
62	0.09	0.44	0.07	0.33
63	0.01	0.16	0.08	0.44
64	0.00	0.00	0.03	0.24
65	0.00	0.05	0.04	0.25
66	0.01	0.22	0.03	0.21
67	0.04	0.31	0.02	0.17
68	0.02	0.25	0.04	0.27
69	0.00	0.07	0.04	0.28
70	0.00	0.00	0.01	0.25
71	0.00	0.00	0.01	0.25

PART II

GROUP DATA

The results reported in this portion of the study are taken from a Master Thesis done by Miss Susan Gorrell done at the University of Cincinnati in the Department of Speech and Theatre Arts under the direction of Dr. Richard R. Kretschmer, Jr.

CHAPTER I

INTRODUCTION

Social interaction is a topic which has recently generated wide-spread interest, but the research in that area has been confined almost solely to adult groups. (Hare, 1962; Kagen, et. al., 1967) A few researchers (Lippit, et. al., 1950; Stevenson and Stevenson, 1961; Shure, 1963; Wahler, 1967) have investigated the social behavior of children; and even fewer (Bradway, 1937; Streng and Kirk, 1938; Avery, 1948; Craig, 1965) have compared the social behavior of normally hearing and hearing impaired children.

The present investigation, therefore, attempts to provide a model for the study of social interaction among children. Specifically, it will provide a model for the comparison of interactions among normally hearing and hearing impaired children.

REVIEW OF LITERATURE

The Children Studied

Two studies have compared the social interactions of normal, middle class children with children who do not fit that description. Lippitt, et. al. (1950) studied the social power attributed to and manifested by middle class, well adjusted ten to thirteen year old males as compared to lower socio-economic, emotionally disturbed boys of the same ages. They found differences in what constituted power for the two groups but likenesses in the ways the children acted toward power figures.

Stevenson and Stevenson (1961) looked at the similarities and differences in social participation of normal and mentally retarded nursery school children. They found that the mentally retarded children had significantly lower proportions of social interaction with their peers.

Though few normative data are available which compare the social behavior of hearing impaired and normally hearing children, several investigators have made that type of comparison using a paper-and-pencil task, namely, the Vineland Social Maturity Scale. Bradway (1937) found that "the deaf group was 20 per cent inferior to hearing subjects in social competence throughout all age levels (five to twenty-one years) examined." (p. 138) Streng and Kirk (1938) concluded that their "group of deaf and hard-of-hearing children was average ... in social maturity." (p. 251) Avery (1948) determined that "Aurally handicapped young children in residential schools and children of similar age who do not attend a residential school are both normal in social maturity as judged by the Vineland Social Maturity Scale." (p. 73)

Two investigators have undertaken experimental studies of the social differences between hearing impaired and normally hearing children. Tiefenbacher (1961) studied the social behavior of ten to twelve year old children. His results showed that, basically, these children were socially comparable to normally hearing children of the same age.

Helen Craig (1965), in a study of the self concepts of hearing impaired and normally hearing children aged nine-and-one-half to twelve, in a social setting, found that "the self-concept of the deaf child is less accurate than the self-concept of the non-deaf child." (p. 470) On the basis of her findings, she concluded, as has this investigator on the basis of the spareness of literature on this topic, that "a need is indicated for greater educational attention to this problem of the social self (of the deaf child) -- the self rising out of social interaction." (p. 472)

The Methods Used

There are three major methods by which social interaction has been studied: paper-and-pencil rating scales administered to the subject or to an intimate informant; observers' diary records of the subjects' activity; and observation combined with the use of a behavior rating scale.

Typical of the paper-and-pencil tasks is the Vineland Social Maturity Scale (VSMS), in which a close informant gives the interviewer information about the subject's social competence. His Social Quotient is then compared to that of normally developing children his chronological age.

The major disadvantage to this type of instrument lies in the variability from interviewer to interviewer and from informant to informant. Illustrative of this is the fact that in the studies reviewed here which utilized the VSMS, two (Streng and Kirk, 1938; Avery, 1948) found that hearing impaired and normally hearing children were socially comparable, while the other two (Bradway, 1937; Myklebust and Burchard, 1964) found hearing impaired children to be significantly socially inferior. The VSMS, then, appears not to yield results which are replicable from study to study.

Perhaps the longest-lived method of assessing children's social behavior is the written diary record. It was utilized as early as 1935, by Dura-Louise Cockrell, and as late as 1967, by Robert Wahler. The method consists simply of an observer's recording, as nearly as possible, everything the child says and does in a given time period. Its disadvantages are fairly obvious: First, it is a difficult task which demands intense concentration and constant writing on the part of the observer; second, it describes only what the child has said and done without making any attempt to discover what that behavior means qualitatively; and finally, much of the child's subsequent behavior is lost to the observer in the process of recording what has just taken place.

In summary, the diary record is a difficult method to utilize and yields less than the maximum possible amount of useful information.

The third method, observation combined with the use of a behavior rating scale, has taken various forms in several studies. Stevenson and Stevenson (1961) devised a scale which included three levels of social participation: 1) interactive: 2) attentive (onlooking activity); and 3) noninteractive. Three observers simply checked the appropriate categories while watching the child play, and their ratings were then compared. This turned out to be a fairly reliable method in terms of observer agreement (.80) and was accurate as a gross qualitative measure of the child's social behavior. Clearly, though, this scale would not be useful in a qualitative study of purely interactive behavior since the categories employed were far too gross.

McConnell and McClamroch (1961) used the Parten Scale to assess the social behavior of two groups of hearing impaired children. This scale hypothesizes six levels of increasingly complex social participation: 1) unoccupied behavior; 2) solitary play; 3) onlooker behavior; 4) parallel play; 5) associative play; and 6) cooperative or organized supplementary play. (p. 355) Here, finally, is an attempt to qualify behavior, though the categories are indistinct. Under many circumstances, unfortunately, it would be very difficult to distinguish onlooker behavior from parallel play or associative from cooperative play, making the achievement of observer agreement highly unlikely.

More distinctive and equally qualitative classifications of behavior are found in the research of Lippitt, et. al. (1950) These have been adopted, with some refinement, for use in the present study (see the Interaction Scale, Appendix A)..

There are two major behavioral dimensions, namely, social (contact) and nonsocial (noncontact). "Social" activity refers to the time the child spends interacting with another or others, while "nonsocial" activity refers to the time he spends alone.

If the behavior can be classified as "social", it falls into one of two categories under that heading: behavior contagion or direct influence. Behavior contagion is defined as: "The spontaneous pick-up or imitation by other children of a behavior initiated by one member of the group, where the initiator did not display any intention of getting the other to do what he did." (p. 251) A child may either initiate or pick up contagion.

Direct influence is a "social interaction in which one child consciously and deliberately tries to get another child to do something in such a way that the research observer is aware of the intent." (p. 254) A child may either attempt to influence, or he may be influenced.

Nonsocial activity includes four categories: 1) Object-directed behavior is anything a child performs with or toward an object, such as a toy; 2) self-directed behavior might be making faces at himself in the mirror or playing with his fingers; 3) observing others is simply sitting or standing quietly, watching what another is doing; and 4) static behavior is sitting or standing, in a zombie-like fashion, not apparently watching or doing anything at all.

This scale has two important advantages over those previously described, which have determined its suitability for use in this investigation. First, it qualifies all social behavior of children in a play setting; and, second, it does so in distinctively observable units, capable of being both timed and rated.

STATEMENT OF THE PROBLEM

In view of the dearth of studies comparing the social interactions among groups of normally hearing and hearing impaired children, and in view of the fact that this rating scale has not previously been utilized in making such comparison, it is apparent that this research asks unique questions:

1) Can reliable observer agreement be obtained with use of the Interaction Scale?

2) If so, will application of the Interaction Scale show differences in the social interactions among comparable triads of normally hearing and hearing impaired children?

The importance of answering these questions cannot be over emphasized. It is vital to the education of hearing impaired children that we have a means of discovering their social similarities to, and differences from, normally hearing children. Only when we have this information can we play educational programs which truly reach the children they are aimed at.

The success of the child's integration into normally hearing society stands or falls on his early training. If this training does not adequately take into account his social habits and capacities, it runs the risk of turning out a communicative, knowledgeable sociopath.

CHAPTER II

PROCEDURES AND METHODS

Subjects

Nine pairs randomly selected from the seventy-one pairs of children included in the first portion of this report, were asked to participate in the second phase of this study. Table 1 presents the pertinent identifying information concerning these nine pairs of children. Data concerning birth order, religion, and geographic distribution have been discussed in Section I of this final report, and will not be repeated here.

Procedures

From the above sample, three triads of normally hearing children were formed with an effort made to keep chronological age of the three subjects less than six months apart. Three triads of hearing impaired children were formed from the deaf subjects who were matched individually with the normally hearing children. As can be seen from Table 1, children 1-A, 2-A, and 3-A formed the first hearing impaired triad, and their matches, children 1-B, 2-B, and 3-B, comprised the first normally hearing triad. The remaining triads were formed in comparable manner.

Each group of three children was brought separately into the

TABLE 1

DESCRIPTION OF SUBJECTS

Child	Hearing* R	Hearing* L	Sex	Race	Age	IQ	Socio-Economic Class
1-A	+115 dB	+115 dB	F	W	4-3	110	3
I-B	Normal		F	W	4-9	102	3
2-A	+115 dB	+115 dB	F	W	4-11	103	4
2-B	Normal		F	W	4-7	105	4
3-A	72 dB	115 dB	F	W	4-5	96	3
3-B	Normal		F	W	4-5	101	3
4-A	65 dB	70 dB	M	W	6-0	96	4
4-B	Normal		M	W	5-8	97	4
5-A	+115 dB	+115 dB	M	W	5-2	90	4
5-B	Normal		M	W	5-5	92	4
6-A	85 dB	105 dB	M	W	5-5	105	4
6-B	Normal		M	W	5-5	108	4
7-A	96 dB	95 dB	F	W	6-8	103	3
7-B	Normal		F	W	6-8	101	3
8-A	85 dB	78 dB	M	W	6-5	116	2
8-B	Normal		M	W	6-5	110	2
9-A	85 dB	95 dB	M	W	6-4	110	2
9-B	Normal		M	W	6-7	117	2

*For children A, pure tone average for two or three frequencies.

same toy-filled television studio, which has been described in great detail in Section I of this final report, by a member of the research staff, who provided the uniform direction that the children could play there until he or she returned to retrieve them. Instructions to the hearing impaired children were again supplemented by gestures. The triads of children were then left in the television studio for thirty minutes.

Method of Observation

Videotape observation was made for each of the six triads of children. During each thirty minute session, the cameras were focused for ten minutes on each child within the triad. The order of observation for each of the matched triads was the same, so that if subject 1-A was observed for the first ten minutes in the hearing impaired triad, subject 1-B was observed first in his triad, and so forth throughout the remainder of the videotaped session. Order of observation within triads was decided on a random basis.

Two additional tapes, one of a group of hearing impaired children and one of a comparable group of normally hearing children, were made for training purposes. Thus, there was a total of eight videotapes, six for use in the study and two for the purpose of training judges to rate children's social interaction behavior.

The judges were two female graduate students in psychology. They had no previous knowledge of this or any similar study prior to their participation in this research.

The judges were trained together in the use of the Interaction Scale, by means of verbal and written explanation. (See Appendix B for Instruction to Judges) After presentation of the instructions they viewed the two practice tapes and compared judgements of behavior using the Interaction Scale until agreement was consistent. This was accomplished in one training session which lasted two hours.

Upon completion of the training period, the judges viewed the six research tapes, presented in random order. They were instructed to categorize the social interaction behavior of each triad. All statistical and descriptive analyses reported in the remainder of this report were based on these ratings of the social interaction behavior of three triads of normally hearing children and three triads of hearing impaired children.

CHAPTER III

RESULTS

The purpose of the present study was to investigate the social interactions of comparable groups of hearing impaired and normally hearing children, using an Interaction Scale as the evaluation instrument.

The Interaction Scale consisted of two dimensions, namely, Contact and Noncontact, with eight major categories subsumed under them. Contact behavior could include Contagion, which was defined as the imitation of a behavior when the initiator showed no indication of seeking to be imitated, or Direct Influence, wherein the initiator obviously tried to get another child to do what he was doing. Noncontact behavior could be Object-Directed (e.g., playing with a toy), Self-Directed (e.g., looking in a mirror), Observing Others, or Static (e.g., doing nothing).

Reliability of the Instrument

When both judges had viewed all the videotapes, the investigator used their rating sheets to total the number of observed behavior units for each judge for each child. From these data, means, standard deviations, and ranges were computed. These data are presented in Table 2. The results were then subjected to a t-test (Walker and Lev, 1953), also shown in Table 2. Since the t-value

TABLE 2

MEANS, STANDARD DEVIATIONS, AND RANGES OF TOTAL NUMBER OF BEHAVIOR UNITS IDENTIFIED BY TWO JUDGES FOR TOTAL GROUP

(N = 18)

Judge	Mean	S.D.	Range
C	30.77	7.40	16 - 44
L	29.66	6.65	18 - 40

RESULTS OF T-TEST OF TOTAL BEHAVIOR UNITS IDENTIFIED BY TWO JUDGES

Judge	Mean	t-Value
C	30.77	.47*
L	29.66	

*$t_{.99}$ 2.46

does not approach significance, it can be assumed that the two judges were statistically comparable in their ratings of total number of behavioral units.

Next, the number of behavioral units identified by each judge for each of the eight major categories was totalled. A Chi Square (x^2) Test (Siegel, 1956, p. 104) was used to compare the two judges, and no significant difference was found as can be seen in Table 3. This indicates that the two judges classified behavior into the eight categories in essentially the same way.

Each of the subcategories under the first four major categories was then examined. Table 4 shows the totals for the two judges' assignments of behavior into each category and subcategory. Note that each group of subcategories represents a forced-choice situation. In Category I, for example, the judge must make one choice among subcategories A, B, and C (Action, Interaction, or Nonaction) and one choice between subcategories D and E (Vocal or Nonvocal).

Since Table 3 showed that there was no significant disagreement between judges' ratings of the major categories, the concern was whether there was disagreement between judges' assignments of behavior into the subcategories. From inspection of Table 4, it appears that, in nearly every subcategory, there was almost perfect agreement between judges. Two exceptions were subcategories III-C and III-H. The judges had no trouble agreeing as to when a direct influence attempt was nonvocal, but often disagreed as to when it was vocal; similarly, they agreed about when a direct influence attempt was unsuccessful, but disagreed about when it was successful.

TABLE 3

CHI SQUARE (x^2) RESULTS COMPARING TOTAL BEHAVIOR UNITS FOR EACH MAJOR CATEGORY FOR TWO JUDGES

Category	Judge C	Judge L	Total
I	48	48	96
II	54	53	107
III	137	124	261
IV	77	72	149
V	160	160	320
VI	13	11	24
VII	65	62	127
VIII	0	4	4
	—	—	—
TOTAL	554	534	1088

$x^2 = 1.5480$*

*$x^2_{.99}$ 18.48

TABLE 4

TOTALS FOR TWO JUDGES' ASSIGNMENTS OF BEHAVIOR
INTO EACH CATEGORY AND SUB-CATEGORY*

Behavior	Judge C	Judge L
Category I	48	48
Sub-Category A	43	45
Sub-Category B	4	3
Sub-Category C	1	0
Sub-Category D	20	28
Sub-Category E	19	29
Category II	54	53
Sub-Category A	49	50
Sub-Category B	5	3
Sub-Category C	0	0
Sub-Category D	22	32
Sub-Category E	24	29
Category III	137	124
Sub-Category A	100	94
Sub-Category B	37	30
Sub-Category C	117	106
Sub-Category G	20	18
Sub-Category H	82	71
Sub-Category I	55	53
Category IV	77	72
Sub-Category A	51	50
Sub-Category B	26	22
Sub-Category C	49	42
Sub-Category D	28	30

*Forced-choice sub-categories are grouped together.

Comparison of Hearing Impaired to Normally Hearing Children

With the above exceptions, the Interaction Scale has proved to be a reliable instrument for analysis of these data. Since rater-disagreement was nonsignificant but agreement was less than 100%, the data for Rater C were arbitrarily selected for the purpose of determining whether any differences existed between the interactions of hearing impaired children and those of normally hearing children.

Number of Behavior Units

The numbers of behavior units assigned to hearing impaired and to normally hearing children were totalled. Table 5 presents the means, standard deviations, and ranges for both groups of children, as well as the t-test result comparing the performances between the two groups. This latter result indicated that there was no significant difference between the total number of behaviors for the two groups. This being the case, all further treatement of behavioral similarities and differences were descriptive in nature.

Behavior in Major Categories

Table 6 lists the total number of behavior units in each major category assigned to each group of children. In categories I and II, Contagion Initiation and Pick-Up, there was little difference in the quantity of behavior of the two groups. In categories III and IV, Influence Attempt and Pick-Up, however, the differences were striking. Hearing impaired children attempted to influence one another only two-thirds as many times as normally hearing children and responded to influence attempts only one-half as many times.

TABLE 5

MEANS, STANDARD DEVIATIONS, AND RANGES OF TOTAL NUMBER OF BEHAVIOR UNITS OCCURRING IN EXPERIMENTAL GROUPS

Group	Mean	S.D.	Range
Hear. Imp. (N = 9)	27.0	7.31	16 - 39
Norm. Hear. (N = 9)	34.5	5.55	25 - 44

RESULTS OF T-TEST OF TOTAL BEHAVIOR UNITS OF EXPERIMENTAL GROUPS

Group	Mean	t-Value
Hear. Imp.	27.0	2.47*
Norm. Hear.	34.5	

$^{*}t_{.99}$ 2.58

TABLE 6

TOTAL NUMBER OF BEHAVIORAL UNITS IN EACH MAJOR CATEGORY FOR EXPERIMENTAL GROUPS

Category	Number of Behavior Units	
	Hearing Impaired (N = 9)	Normally Hearing (N = 9)
I	19	29
II	29	25
III	56	85
IV	25	52
V	67	93
VI	12	1
VII	35	30
VIII	0	0

The noncontact behavior of the two groups also showed some distinctive differences. Hearing impaired children indulged in object-directed activity only about two-thirds as much as did normally hearing children, but they involved themselves in self-directed behavior twelve times as much as did the normally hearing group.

The two groups did approximately the same amount of observing others and neither group exhibited static behavior.

Behavior in Subcategories

The total number of behavior units assigned to each subcategory for each group is presented in Table 7. The most arresting differences were found in subcategories I-D, II-D, and IV-C (vocal behavior); II-G and IV-D (nonvocal behavior); and II-B and IV-B (nonaction behavior). Normally hearing children accompanied their activity with vocalization more than twice as much as hearing impaired children, while the reverse also held true. Directly related to this was the nonaction behavior (III-B and IV-B) of the normally hearing group, which exceeded by more than three times that of the hearing impaired group. The fact that this occurred in interaction situations, i.e. during influence attempts or pick-ups, can only be explained by assuming that the interaction consisted solely of vocal exchanges.

In summary, the social interactions of hearing impaired and normally hearing children were similar with the distinct exceptions that: 1) hearing impaired children attempted and responded less to direct influence; 2) normally hearing children were more likely to direct their attention to objects than were hearing impaired children; 3) self-directed behavior was exhibited much more frequently

TABLE 7

TOTAL NUMBER OF BEHAVIOR UNITS IN EACH SUB-CATEGORY FOR EXPERIMENTAL GROUPS

Sub-Category	Number of Behavior Units	
	Hearing Impaired (N = 9)	Normally Hearing (N = 9)
I-A	16	27
I-B	3	1
I-C	0	1
I-D	6	14
I-E	19	13
II-A	27	22
II-B	2	3
II-C	0	0
II-D	10	12
II-E	19	13
III-A	48	52
III-B	8	29
III-C	37	80
III-G	20	1
III-H	32	49
III-I	24	32
IV-A	22	29
IV-B	3	23
IV-C	7	42
IV-D	18	10

by normally hearing children; and 5) correspondingly, nonactive behavior was noted in far greater degree among the normally hearing group.

CHAPTER IV

DISCUSSION

Limitations

The limitations of this portion of the study centers around three areas, namely, the Interaction Scale itself, sample size, and analysis of the data.

Interaction Scale

It has been demonstrated that the Interaction Scale is a reliable, useful instrument for the study of interaction among groups of hearing impaired and normally hearing children. The only disagreement between the raters which was remarkable occurred in the two sub-categories: Vocal Direct Influence Attempt and Successful Direct Influence Attempt. There is, of course, the possibility that these are not viable classifications, but, in retrospect, this investigator finds it more likely that one of two conditions produced this rater disagreement: Either the sub-categories were not sufficiently defined before the rating process began, or the limitations of the videotape equipment often made it impossible to see who was vocalizing at a particular time and whether the direct influence attempt was responded to by another child, who may have been out of camera range. These possibilities are mentioned in the hope that future researchers, instead of discarding these two classifications, will attempt to render them more meaningful, since both classifications can make useful distinctions between behavioral activities.

A further possibility is the addition of another dimension to the Interaction Scale. It might prove valuable to have judges both classify the behavior and time its duration. A reason for this addition is that, although, for example, the normally hearing subjects in this study exhibited a greater quantity of object directed behavior, there is the possibility that the hearing impaired children spent more time in such behavior. This could be useful information. The duration dimension was provided for the scale as it now exists, but it was decided that the processing of that amount of data was beyond the scope of this particular study. The Instructions to the Judges in Appendix B contain implementation for this procedure.

Sample Size

The sample selected for study was, because of time limitations, quite small. The similarities and differences in behavior found here, while meaningful, are likely to be acted upon by educators and others dealing with preschool, hearing impaired children, only when the number of children studied is impressive enough to command attention. Therefore, a study which replicates this one on a larger scale, needs to be done. Only then will the results obtained here become meaningful in the absolute sense.

Analysis of the Data

The present study concentrated its efforts primarily on quantitative analysis of total output of the various sub-categories. It would be useful to assess the sequence in which behavioral units occur. Knowing the patterns of social interactions of large numbers of children may well provide us with a diagnostic tool for categorizing normal and non-normal behavioral styles for both normally hearing and hearing impaired children.

Future Research Needs

Future research needs are several. First, this study needs to be replicated on a larger scale making such adjustments as have already been discussed. As was the case with the individual play situation data, consideration should be given to investigating social interaction, using the Interaction Scale, under a variety of circumstances, particularly in social surroundings more familiar to the children, i.e. school and home.

Since the Interaction Scale has proved useful in the study of normally hearing and hearing impaired children, there is no apparent reason for its not being used in other types of investigations. Future researchers may find it valuable, for instance, in comparing the social interactions of normally developing children with those having mental retardation, emotional disturbance, and/or language or learning delay.

The Interaction Scale would also make a useful instrument for the comparisons of the social interactions of young children with those of older children - especially if a longitudinal study could be developed which measured the same children at different stages of growth. In this way, the behavior of normal developing children of varying ages could be compared with that of handicapped children who are in the process of, or have undergone, some sort of therapeutic treatment.

Implications

The types of differences found between hearing impaired and normally hearing children as a result of this investigation were not surprising, but it is extremely valuable to have experimental evidence to support what we have only surmised until now: That there are ways in which hearing impaired children do not act "normal." They approach one another less, they respond to another's overtones less, they vocalize less, and they attend to themselves more.

Since much of the knowledge gained concerning play and language is often obtained through interactions with others, particularly peers, it is easy to see how lack of development of appropriate play and linguistic abilities can occur without direct outside intervention. If our concern is the eventual integration of the hearing impaired child into a hearing world, even on a limited basis, we must begin to help the hearing impaired child become a more outward-directed child - more interested in the people and world around him and in establishing communication with them.

Specifically, educationally, the results of this study argue strongly for a group approach to the education of hearing impaired children. This does mean hooking eight to ten children up electronically to a teacher who dominates the "lesson." It means taking pains to interest the children in each other on a one-to-one basis - as people, not as beings with a common ear problem.

A sample format for this type of education might be to pair children into a kind of "buddy" system, wherein each is responsible for the security and success of the other. Activities would be goal-directed ones which would require productive interaction for their completion. The teacher would, then, become a facilitator of interaction, or group manager, rather than teacher or lecturer. This new role is better suited than the old to the dual responsibility we have in the education of hearing impaired children, namely, not only providing them with information, but also a sense of themselves as members of the larger community.

Another implication may be the need to integrate young hearing impaired children with normally hearing children, who perform social acts more outward in nature. Such exposure may provide a model for interaction development to occur in hearing impaired children. Systematic study, perhaps with the Interaction Scale, needs to be undertaken, however, to see if such an arrangement would have a beneficial influence in producing this needed outward movement in young hearing impaired children.

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APPENDIX A

INTERACTION SCALE

INTERACTION SCALE

OBSERVER ____________________ CHILD ____________

BEHAVIOR UNIT ____________________ DURATION ______ ' ______ "

CONTACT

I. Contagion Initiation (Check 2 sub-categories)

A. Action ____________

B. Interaction ____________

C. Nonaction ____________

D. Vocal ____________

E. Nonvocal ____________

II. Contagion Pickup (Check 2 sub-categories)

A. Action ____________

B. Interaction ____________

C. Nonaction ____________

D. Vocal ____________

E. Nonvocal ____________

III. Direct Influence Attempt (Check 3 sub-categories)

A. Action ____________

B. Nonaction ____________

C. Vocal ____________

D. Command ____________

E. Suggestion ____________

F. Request ____________

G. Nonvocal ____________

H. Successful ____________

I. Unsuccessful ____________

IV. Influence Pickup (Check 2 sub-categories)

A. Action ____________

B. Nonaction ____________

C. Vocal ____________

D. Nonvocal ____________

INTERACTION SCALE

OBSERVER ____________________________________ CHILD ________________________

BEHAVIOR UNIT ________________________________ DURATION _______ ' _______ "

NONCONTACT (Check One)

V. Object - Directed	
VI. Self - Directed	
VII. Observing Others	
VIII. Static	

APPENDIX B

INSTRUCTIONS TO JUDGES

INSTRUCTION TO JUDGES

Using videotapes, you are going to observe and classify the social behavior of 18 children, nine with normal hearing and nine with significant hearing impairment. In groups of three, the children spent thirty minutes playing together, with the camera focused on one child at a time for a ten-minute period. There is a thirty second break in the tape at the end of each of these periods. Shorter breaks occur at one-minute intervals.

Now look at the rating scale. You will be asked to make two separate judgements about the child's behavior: first, how long it lasted and, second, what it consisted of; so you will be looking at each tape twice. The first time, with a stop watch, you will time the duration of each behavior unit. For example, suppose that for the first thirty seconds the child simply sits and watches the others. You would designate this Behavior Unit 1, Duration 30" at the top of the sheet; then you would go immediately to a new rating sheet, time the duration of whatever the child does next and designate it Behavior Unit 2. The length of Duration depends on a change in the child's behavior. He may move from one place to another and change his activity, or he may stay where he is and begin to do something different. You will use as many sheets as there are different behaviors of one child in a 10-minute period. When you have finished the timing, you will go back and view the tape again, this time checking in the appropriate columns on each sheet what the behavior was.

As you can see, there are two major dimensions (Contact and

Noncontact) with categories and subcategories under them. Contact refers to the time the child spends interacting with another or others, while Noncontact is the time he spends alone. He can't be doing both those things at the same time. If the behavior can be classified as Contact, you will check one of the major categories (designated by Roman numerals) under that heading and then as many subcategories as are indicated.

Behavior Contagion is defined as: "The spontaneous pick-up or imitation by other children of a behavior initiated by one member of the group, where the initiator did not display any intention of getting the others to do what he did." A child may initiate or pick-up contagion but not both things at the same time.

Action is anything the child performs alone.

Interaction is anything he performs with another or others.

Nonaction: The child is doing nothing and another child picks it up, either by contagion or direct verbal influence.

A Direct Influence Attempt is a "social interaction in which one child consciously and deliberately tries to get another child to do something, in such a way that the research observer is aware of the intent." This may be accomplished by Command, e.g. "Do this," or something similar; Suggestion, e.g. "Let's do this"; Request, e.g. "Will you do this?"; or other vocal means.

A child may either attempt to influence or he may be influenced; not both at the same time.

Under Noncontact, Object-directed behavior is anything a child performs with or toward an object, such as a toy. Self-directed behavior might be making faces at himself in the mirror or playing with his fingers. Observing Others is simply sitting or standing quietly watching what another is doing. Static behavior is sitting or standing, zombie-like, not apparently watching or doing anything at all.

Your rating must be done independently of the others', though you may do it in the same room at the same time if you wish. Feel free to stop and rewind the tape at any time.

We're going to practice now, with a tape that is similar to, but not the same as, those we will be using in the study.

APPENDIX C

RAW SCORES FOR BOTH JUDGES FOR ALL SUBJECTS

Category	Child 1A		Child 2A		Child 3A		Child 4A		Child 5A		Child 6A		Child 7A		Child 8A		Child 9A	
	C	L	C	L	C	L	C	L	C	L	C	L	C	L	C	L	C	L
I	2	2	3	3			1	3	6	4	4	4	1		1	1	1	2
IA	2	2	3	3			1	3	4	3	3	3	1		1	1	1	2
IB									2	1	1	1						
IC																		
ID									3	1	2	3					1	2
IE	2	2	3	3			1	3	3	3	2	1	1		1	1		
II	5	3	2	2	3	4	2	2	4	5	5	1	2		6	6		3
IIA	4	2	2	1	3	4	2	2	3 54	5	5	1	2		6	6		3
IIB	1	1		1					1									
IIC																		
IID	1		1	1					1	2	2		1		4	5		1
IIE	4	3	1	1	3	4	2	2	3	3	3	1	1		2	1		2
III	3	3	3	3	2	2	7	7	11	7	8	6	4	3	9	9	9	13
IIIA	2	3	3	3	2	2	6	6	11	7	5	5	4	3	8	7	7	13
IIIB	1						1	1			3	1			1	2	2	
IIIC	2	1	3	3			4	4	6	2	5	3	3	3	7	8	7	13
IIID		1	1	1			1	1			2				7	7	5	7
IIIE							1	2										
IIIF																		
IIIG	1	2			2	2	3	3	65	5	3	3	1		2	1	2	
IIIH	1	2	1	1	1	1	5	4	4	3	6	5	3	2	6	6	5	9
IIII	2	1	2	2	1	1	2	3	67	4	2	1	1	1	3	3	4	4
IV	2	2					2	1	6	3	3	4	2	1	1	1	9	9
IVA	2	2					1	1	5	3	3	3	1	1	1	1	9	8
IVB							1		1			1	1					1
IVC											1	2	1		1	1	4	2
IVD	2	2					2	1	6	3	2	2	1	1			5	7
V	7	10	9	10	3	3	9	10	6	7	9	11	8	10	9	9	7	6
VI	3	2			1	1	3	1	2	4	1		2	2				
VII	5	7	3	3	7	7	1		4	2	4	3	2	2	4	3	5	3
VIII						1				2								
Total	27	24	20	21	16	18	25	24	39	34	34	24	21	18	30	24	31	36

Child 1B		Child 2B		Child 3B		Child 4B		Child 5B		Child 6B		Child 7B		Child 8B		Child 9B	
C	L	C	L	C	L	C	L	C	L	C	L	C	L	C	L	C	L
2	2	1	1	1	2	2	2	9	9	5	4	4	4	1	1	4	4
2	2	1	1	1	2	1	1	9	9	4	4	4	4	1	1	4	4
						1	1										
										1							
2	2			1		2		8	9				1			1	1
		1	1		2		2	1		5	4	4	3	1	1	3	3
3	1	4	4	2	7	5	5	2	2	4	3			3	4	2	1
2	1	3	4	2	7	5	5	2	2	3	2			3	4	2	1
1		1								1	1						
2	1	2	2	2	4	1	2	1	1	1	1			2	4	1	
1		2	2		3	4	3	1	1	3	2			1		1	1
10	10	10	6	14	8	2	2	15	17	7	7	6	6	9	8	8	7
7	8	8	4	12	7			12	13	5	4			6	6	2	3
3	2	2	2	2	1	2	2	3	4	2	3	6	6	3	2	6	4
9	9	10	5	14	8	2	2	15	17	7	7	6	6	9	8	8	7
		4		1		2	2	5	9	1	[illegible]	3	3	4	2	5	4
3		4	1	8	6			1				2		3	2	2	1
3	3			3				3	2	2							2
1	1		1														
7	7	6	2	10	5	2	1	10	10	5	5	3	4	3	1	3	3
3	3	4	4	4	3		1	5	7	2	2	3	2	6	7	5	4
2	2	7	9	15	11	6	6	2	2	5	5	4	3	7	7	4	6
1	1	5	6	10	10	4	3			3	2	1	1	4	6	1	2
1	1	2	3	5	1	2	3	2	2	2	3	3	2	3	1	3	4
1	1	7	6	12	10	4	3			4	3	4	3	7	6	3	5
1	1		3	3	1	2	3	2	2	1	2				1	1	1
12	10	6	5	10	7	13	10	11	8	12	12	7	8	9	8	13	16
										1	1						
7	10	3	3	2	2	5	4	1	2	3	3	4	4	2		3	4
							1										
36	35	31	28	44	37	33	30	40	40	37	35	25	25	31	28	34	38